DOCUMENT RESUME

ED 060 529 EA 004 069

AUTHOR	Clinchy, Evans; And Others
TITLE	Schools: More Space/Less Money. A Report.
INSTITUTION	Educational Facilities Labs., Inc., New York, N.Y.; Educational Planning Associates, Inc., Boston, Mass.
PUB DATE	Nov 71
NOTE	85p.
AVAILABLE FROM	EFL, 477 Madison Avenue, New York, N.Y. 10022 ($2.00)
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	Building Conversion; Building Improvement; *Building Innovation; Component Building Systems; Construction Costs; *Cost Effectiveness; Educational Finance; Extended School Day; *Extended School Year; *Open Education; Open Plan Schools; School Buildings; School Community Relationship; School Design; School Space; *Space Utilization; Systems Approach
IDENTIFIERS	Fastracking; Floating Schools; Joint Occupancy

ABSTRACT

Discovered or "found" space in a school system most often appears as (1) space that a school system already owns in its outdated buildings and which is being used inefficiently; and (2) space lying close at hand in warehouses, factories, industrial plants, or in little-used public buildings. Found space is one solution to the problem of providing needed school space despite an inability to raise money to build new schools. Many school systems are exploring economical alternative solutions to the school space problem that would provide new or modernized old space at a reduced cost, more space or better space for the same amount of money, greater use out of existing space, and less expensive alternatives to conventional school space. This document collects all the alternatives known to EFL that appear to be actually working or that have been planned to help solve school problems. (Author)

EA 004 069

FOUND SPACE

Finding Space in School Building

Finding Space in Non School Buildi

THE FULLY USED SCHOO

The Extended School Day

The Extended School Year

HELPING STUDENTS GROW W

Open Campus Schools

Home Base Schools

Non School Schools

Resource Centers

Implications for Design of New Sch

NEW WAYS TO BUILD

The Systems Approach to School Bui

Fast-Tracking

Floating Schools

Large, Inexpensive Structures

Economies of Open Space

SHARING THE COST OF NEW SC

Joint Occupancy

Finding Partners

PUTTING ALTERNATIVES TOGE

INFORMATION SOURCES

FOUND SPACE

Finding Space in School Buildings

Finding Space in Non School Buildings

THE FULLY USED SCHOOL

The Extended School Day

The Extended School Year

HELPING STUDENTS GROW WINGS

Open Campus Schools

Home Base Schools

Non School Schools

Resource Centers

Implications for Design of New Schools

NEW WAYS TO BUILD

The Systems Approach to School Building

Fast-Tracking

Floating Schools

Large, Inexpensive Structures

Economies of Open Space

SHARING THE COST OF NEW SCHOOLS

Joint Occupancy

Finding Partners

PUTTING ALTERNATIVES TOGETHER

INFORMATION SOURCES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION
THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

EFL

A Report from Educational Facilities Laboratories

"PERMISSION TO REPRODUCE THIS COPYRIGHTED MATERIAL HAS BEEN GRANTED BY
Educational Facilities Labs
TO ERIC AND ORGANIZATIONS OPERATING UNDER AGREEMENTS WITH THE U.S. OFFICE OF EDUCATION. FURTHER REPRODUCTION OUTSIDE THE ERIC SYSTEM REQUIRES PERMISSION OF THE COPYRIGHT OWNER."

EFL

Educational Facilities Laboratories, Inc., is a nonprofit corporation established by The Ford Foundation to help schools and colleges with their physical problems by the encouragement of research and experimentation and the dissemination of knowledge regarding educational facilities.

BOA
Milto
Chair
Alvin
Presi
Clay P
Form
James
Chair
Henry
Corp
Morri
Attor
Harol
Presi
J. E. J
Hono
Philip
Chair
Marti
Presi
Howa
Chair
Benja
Super
OFFI
Haro
Alan
STA
John
Ben E
Euge
Peter
Larry

BOARD OF DIRECTORS

Milton C. Mumford, *Chairman*
Chairman of the Board, Lever Brothers Company
Alvin C. Eurich, *Vice Chairman*
President, Academy for Educational Development, Inc.
Clay P. Bedford
Former President, Kaiser Aerospace & Electronics
James C. Downs, Jr.
Chairman of the Board, Real Estate Research Corporation
Henry Dreyfuss
Corporate Advisor
Morris Duane
Attorney, Duane, Morris and Heckscher
Harold B. Gores
President, Educational Facilities Laboratories
J. E. Jonsson
Honorary Chairman of the Board, Texas Instruments, Inc.
Philip M. Klutznick
Chairman of the Board, Urban Investment and Development Co.
Martin Meyerson
President, University of Pennsylvania
Howard S. Turner
Chairman of the Board, Turner Construction Company
Benjamin C. Willis
Superintendent of Schools, Broward County, Florida

OFFICERS

Harold B. Gores, *President*
Alan C. Green, *Secretary and Treasurer*

STAFF

John R. Boice, *Project Director*
Ben E. Graves, *Project Director*
Eugene Ezersky, *Project Director*
Peter Green, *Editor*
Larry Molloy, *Project Director*
Catherine Slade, *Librarian*
Lillian Sloves, *Publications Associate*
Danae Voltos, *Information Associate*
Mary C. Webb, *Assistant Treasurer*
Ruth Weinstock, *Research Associate*

, is a nonprofit corporation
elp schools and colleges with
ement of research and
of knowledge regarding

SCHOOLS: MORE SPACE/LE

A Report from Educational Facilities Laboratories

E SPACE/LESS MONEY

n Educational Facilities Laboratories

First Printing November 1971

Library of Congress Catalog No. 70-182382

Copies of this publication are available at $2.00 from EFL, 477 Madison Avenue, New York, N.Y. 10022.

Design: *Zaro Calabrese*
Printing: *Georgian Lithographers, Inc.*
Photography: *George Zimbel, Pages 23, 31.*
Frank V. Carioti, Page 18.

	FOREWORD	4
1	FOUND SPACE	5
	Finding Space in School Buildings	5
	Finding Space in Non School Buildings	6
2	THE FULLY USED SCHOOL	9
	The Extended School Day	9
	The Extended School Year	11
3	HELPING STUDENTS GROW WINGS	14
	Open Campus Schools	14
	Home Base Schools	16
	Non School Schools	16
	Resource Centers	19
	Implications for Design of New Schools	20
4	NEW WAYS TO BUILD	21
	The Systems Approach to School Building	21
	Fast-Tracking	22
	Floating Schools	25
	Large, Inexpensive Structures	25
	Economies of Open Space	27
5	SHARING THE COST OF NEW SCHOOLS	30
	Joint Occupancy	30
	Finding Partners	30
6	PUTTING ALTERNATIVES TOGETHER	34
	INFORMATION SOURCES	40

FOREWORD

School systems all over the country are caught in a tight bind between the need to provide school space and an inability to raise money to build new schools.

The situation is particularly desperate for cities and towns where the school population is still expanding. Even in places where the population is stable or declining, school buildings become obsolete, both physically and educationally. It is not an easy task these days to provide adequate school space of any kind.

The rapid inflation of construction costs; the general slow-down in the nation's economy with its resulting unemployment; the sharp rise in educational costs; all these contribute to the reluctance of taxpayers to raise local property taxes. Whatever the specific causes may be, it is more difficult to pass a bond issue now than at any time since World War II.

But school children still need to be decently housed in order to be educated. If it appears to be impossible to authorize new schools, what can a conscientious school board or school administrator do?

This national dilemma has encouraged many school systems to explore a growing range of alternative solutions to provide school space in the most economical fashion. "Economical" in this context can have one of four meanings: providing new or modernized old space at a reduced cost: getting more space or better space for the same amount of money; getting much greater use out of existing space;

finding less expensive alternatives to conventional school space.

The search for alternatives has led in many cases to a re-examination of traditional assumptions about how school space can best be provided and used. Out of desperate necessity has come a burst of new thinking about the traditional American schoolhouse.

To report on the available alternatives, EFL commissioned Educational Planning Associates, Inc., of Boston. Four members of the firm prepared this report: Evans Clinchy, president, Peter S. Capernaros, Nancy Cynamon, and Kathryn S. Rogers. A condensed version appeared in EFL's quarterly newsletter, *Schoolhouse,* in June, 1971.

Schools: More Space/Less Money collects all the alternatives known to EFL that appear to be actually working or that have been planned to help solve school space problems. No attempt has been made to evaluate each alternative or to prove that it really works. Some of them are only in the planning stages, but are included because they reveal the intentions and expectations of the originators.

No school system should expect that any of the alternatives will provide magical answers to its problems. Most of the alternatives were developed over a period of several years, involved lengthy trial and experimentation, and are now accepted as constructive innovation. Others are still being developed, and will be affected by the way other school districts adapt the principles to their own requirements.

1 FOUND SPACE

Discovered or "found" space is space a school system did not realize was there. It most often appears in two disguises:

—Space a school system already owns in its own outdated buildings which is not being used as efficiently as it could be.

—Space lying close at hand in warehouses, factories, industrial plants, or in under-used public buildings.

Finding Space in School Buildings

Many structurally sound school buildings waste space in large corridors and lobbies, and large, poorly used auditoriums and cafeterias. These schools, however, do not have to be abandoned as useless; they can be economically modernized and redesigned to accommodate contemporary educational programs, and their capacity increased at the same time. School systems throughout the country have begun to "find" space in their existing school buildings—some merely by rearranging interior space, some by adding new space that enables more efficient rearrangement and use of existing space.

In most cases the road to "found" space leads to opening up the existing building—converting from the conventional eggcrate classroom arrangement to an open-plan arrangement. This can result in a substantial increase in the net-gross floor area ratio, and it can bring about other benefits such as those achieved by the Cherry Creek school district in Colorado.

The Cherry Creek school system needed at least 100 new seats in its Eastridge Elementary School. Originally the district planned to add a six-classroom wing to the school's existing plant, thus increasing capacity by 150 students. The cost of this project was estimated at $240,000. Instead, for almost the same amount of money, Cherry Creek has doubled the capacity of Eastridge by modernizing, opening up the interior of the existing building, and adding new space.

The renovation has not only increased capacity but is compatible with the district's new educational program directed toward individualized instruction, multi-age groupings, and team teaching. The renovation program concentrated on opening up space. Walls between classrooms and hallways were removed. The 12 original classrooms were converted into fo from these classrooms was increas building including a kitchen, admi room, was added; and the old mul instructional materials center and of all these changes and additions, increased from 300 to 600 studen

According to estimates prep Haldeman, the percentage of net i rose from 64% to 76% of gross a

The total cost of the renovat with the estimated cost of a six-cla This represents a cost per pupil of the addition would have cost near

The Rios School in the Cajon which is part of the San Diego Co another school that increased its e interior of the building. Cajon Va a way that both existing and new s The district wished to increase cap environment to permit team teach large and small group meetings.

Built in 1958, Rios is a finge the Southwest. Four buildings are The school had a capacity of 430 than build the new wings called fo district roofed over and enclosed t fingers. Non-loadbearing walls be and airconditioning and carpetin created two open learning centers grades 4-6.

The new building added 13, of net instructional space, increas According to Dr. M. Ted Dixon, A was probably even greater than 1(converted to instructional space a existing building.

m did not realize

tdated buildings
e.
s, industrial plants,

ce in large corridors
l cafeterias. These
s useless; they
accommodate
city increased at
try have begun
some merely by
pace that enables
ace.
to opening up
tional eggcrate
t. This can result
atio, and it can
the Cherry Creek

st 100 new seats
district planned to
ant, thus increasing
was estimated at
money, Cherry
lernizing, opening
new space.
but is compatible
ted toward
l team teaching.
p space. Walls
he 12 original

classrooms were converted into four learning areas. Learning space from these classrooms was increased by 4,000 sq ft. A 7,100-sq-ft building including a kitchen, administrative offices, and a multipurpose room, was added; and the old multipurpose room was converted to an instructional materials center and two more learning areas. By means of all these changes and additions, the capacity of the school was increased from 300 to 600 students.

According to estimates prepared by architect William C. Haldeman, the percentage of net instructional space in the building rose from 64% to 76% of gross area after renovation.

The total cost of the renovation project was $247,000, compared with the estimated cost of a six-classroom addition of $240,000. This represents a cost per pupil of $820 for the renovation, whereas the addition would have cost nearly twice as much: $1,600 per pupil.

The Rios School in the Cajon Valley Union School District, which is part of the San Diego County Department of Education, is another school that increased its existing space by opening up the interior of the building. Cajon Valley was able to add new space in such a way that both existing and new space could operate as open-plan. The district wished to increase capacity and to modernize the learning environment to permit team teaching, flexible programming, and large and small group meetings.

Built in 1958, Rios is a finger-plan school, typical of many in the Southwest. Four buildings are connected by a covered walkway. The school had a capacity of 430 in 14 standard classrooms. Rather than build the new wings called for in the master plan, the school district roofed over and enclosed two of the three spaces between the fingers. Non-loadbearing walls between classrooms were removed, and airconditioning and carpeting were installed throughout. This created two open learning centers, one serving K-3, one serving grades 4-6.

The new building added 13,600 sq ft gross and 10,600 sq ft of net instructional space, increasing the capacity to 660 students. According to Dr. M. Ted Dixon, Area Superintendent, the net gain was probably even greater than 10,600 sq ft, since service space was converted to instructional space and walls were eliminated in the existing building.

The principal of the Rios School, David J. Meckel, has reported that the "open-space facility has enhanced the educational program considerably; it allows for individualizing instruction and makes freedom of movement of the children and flexible scheduling a reality." Construction time took only seven months; less time than it would have taken to build new wings.

The Cajon Valley School District found it less expensive to construct open space than to build a conventional school addition. The California School Construction Allowance for the space built was $406,000 (about $30 per sq ft), but the Rios project cost considerably less and achieved a saving of at least $40,000. The total cost of the addition and renovation (including HVAC, carpeting, furnishings, and equipment) came to $25 per sq ft.

The search for found space is sometimes conducted on a district-wide scale. A Portland Public Schools study concluded that "old buildings can be reused and considerable money saved by extensive remodeling and addition when compared to the cost of a new school."

6

The city found that its school plant was not as serviceable as it should be for modern educational programs and practices. In an attempt to reorganize the educational structure (converting from K-8, 9-12 to 4-4-4), and to update educational facilities, the city was faced with the choice of building new schools to accommodate the revised program or of doing something about the existing schools. Since the Portland school population is fairly stable, it was difficult to justify new schools. After intensive study, the school department found it could accomplish its aims by maintaining almost all of the existing schools through renovation and modernization. Only about a dozen pre-World War I buildings would be demolished. This approach to up-dating the school plant required total planning, a process which included the application of systems techniques.

A major emphasis of the new program was to create middle schools for grades 5-8 from some of the existing elementary schools. These buildings were generally sound and well-maintained, and were redesigned for 1,200-student middle schools with about 120 sq ft per student, which is about average for new middle schools throughout the country.

The prototy
War II school of
sq ft, conversion
conversion of the
Plans for the Ge
demolishing thre
of 119,000 sq ft.
open plan, but E
Program, says th
space than tradit
will convert all t

The constru
school was estim
using a building
remodeling, dem
necessary, site w
department coul
and addition to
The estimated sa
based on estimat
$21.70 per sq ft
school construct

Finding Space in

School systems
and supermarke
country.

The space
process of site a
Depending on t
usable space ca
bonus, the infus
enriching effect

The follow
possible, from a
depending upo
desired end-pro

Meckel, has reported
educational program
ruction and makes
ble scheduling a
onths; less time than

t less expensive to
nal school addition.
e for the space built was
project cost considerably
The total cost of the
carpeting, furnishings,

es conducted on a
s study concluded that
e money saved by
npared to the cost of a

not as serviceable as it
and practices. In an
ure (converting from K-8,
cilities, the city was
ls to accommodate the
ut the existing schools.
ly stable, it was difficult to
he school department
ntaining almost all of the
odernization. Only about a
be demolished. This
quired total planning, a
ystems techniques.
n was to create middle
sting elementary schools.
well-maintained, and were
ols with about 120 sq ft per
iddle schools throughout

The prototype design for the Beaumont School, a pre-World War II school of about 50,000 sq ft, calls for an addition of 95,000 sq ft, conversion of the gym into a learning resource center, and conversion of the auditorium into a large-group instruction space. Plans for the George School, which was built in the 1950's, call for demolishing three classroom wings and adding a two-story structure of 119,000 sq ft. The converted building will not necessarily be open plan, but Edward C. Wundram, Director, Systems Building Program, says that opening up the buildings will provide more usable space than traditional plans. Eventually, the reorganization plan will convert all the lower schools to allow for open-plan teaching.

The construction cost for providing a 1,200-student middle school was estimated for both new construction and conversions, using a building-systems approach. This figure includes gutting and remodeling, demolishing portions of the existing structure where necessary, site work, and fixed equipment. It appears that the school department could save about $775,000 per building by renovation and addition to existing buildings instead of new construction. The estimated savings per student would be about $650. Costs were based on estimates of $15.75 per sq ft for gutting and remodeling; $21.70 per sq ft for building additions; and $23.50 per sq ft for new school construction. *(see page 8)*

Finding Space in Non School Buildings

School systems have been finding space in factories, churches, arsenals, and supermarkets and converting it into school space all over the country.

The space is already there, so the often vexing and time-consuming process of site acquisition and land clearance can be eliminated. Depending on the condition of the building, the cost of producing usable space can be much lower than new construction. And as a bonus, the infusion of new life into an old building can often have an enriching effect on the local community.

The following examples indicate the range of conversion types possible, from a bathhouse to a munitions plant. Costs vary greatly depending upon the location and condition of the building, and the desired end-product, as well as local labor costs.

The City of Boston, having neither land, time, nor money for a new school building, took half of an underused public bathhouse and renovated it into a 60,000-sq-ft high school annex. The modernization was accomplished during a summer. Since September, 1970, the bathhouse has accommodated 450 ninth-grade students from South Boston High School.

The 40-year-old concrete building was structurally sound and had a satisfactory heating system. The major work was for interior refinishing, partitioning, movable walls and acoustical ceilings. A huge, cavernous locker room was converted into 16 classrooms and a 90′ x 110′ gym. A cafetorium converts from four classrooms by opening operable walls. The school has a fairly flexible plan, opening off a single-loaded corridor. In 1972, a solarium on the second floor will be renovated for use as a student lounge.

The total cost to turn this portion of the bathhouse into a school was about $650,000, or $11 per sq ft. This contrasts favorably with the current $40-per-sq-ft cost of new school construction in Boston. The cost per student for a 450-student enrollment was about $1,450.

Available bathhouses are rare, but office spaces abound in cities and suburbs. The "Other Ways" program began in 1968 as an open-classroom spin-off from Berkeley High School. Expecting 100 more students, the school needed flexible open-plan space in a hurry. It settled on 5,000 sq ft of vacant office space in an industrial building. The space was available on a short-term basis and could be had rent-free for a year in exchange for remodeling, with $1,500 per month rent thereafter.

The necessary remodeling was minimal and mainly involved bringing the building up to fire-code standards: sheet-rocking walls, electrical work, removing partitions, and rebuilding a stairway. The total cost for renovation was $13,000—$130 per student, or about $2.50 per sq ft.

Industrial buildings provide excellent school spaces, often with higher ceilings than in office buildings. In New York City, P.S. 211, a 650-pupil elementary school, has been successfully housed in a converted factory since September, 1969. The building, with a total of 45,000 sq ft, has three classroom floors plus a penthouse gym,

and a cafeteria-play space on the gro
corridors and the instructional area
net-to-gross ratio of 80%.

The total cost of renovation re
Board of Education specifications w
including carpeting. The lease is for
the rent is $1 per sq ft per year, plus
amortize the renovation cost (a tota
last five years of the lease, the city
per sq ft. In this case the rental proc
space more quickly because capital

The Philadelphia Board of Ed
several old buildings, including a su
building, and a former arsenal to sch
purchased, except the arsenal which
government. The school departmen
costs to be lower than new construc

In 1968, the school departme
Frankford Arsenal Gauge Building
adjacent to a recreation center, a p
school, and just several blocks from
School. The subsequently renovated
autonomous secondary school for 3
has helped to relieve pressure on O

The heavy masonry building is
the interior featured high ceilings, l
columns, and many windows. Reno
complete; the job involved gutting,
the interior; installing carpeting, a
fixtures; rewiring, and generally m
stairwells and corridors. The existi
as well as the HVAC system were s

The 81,600-sq-ft school is a co
shop facilities. It includes 20 gener
labs, 3 business education rooms,
a graphics area, a health education
center, a little theater, and an area

r money for a
bathhouse and
e modernization
1970, the
ts from South

lly sound and
s for interior
l ceilings. A
assrooms and a
rooms by
e plan, opening
e second floor

se into a school
favorably
nstruction in
ment was about

abound in cities
1968 as an
Expecting 100
space in a hurry.
dustrial building.
ould be had
h $1,500 per

inly involved
t-rocking walls,
a stairway.
per student, or

paces, often with
City, P.S. 211,
housed in a
ing, with a total
thouse gym,

and a cafeteria-play space on the ground floor. Because there are no corridors and the instructional areas are all open-space, it has a net-to-gross ratio of 80%.

The total cost of renovation required to meet New York City Board of Education specifications was $635,000, or $14 per sq ft, including carpeting. The lease is for 15 years. During the first 10 years, the rent is $1 per sq ft per year, plus an additional $2 per sq ft to amortize the renovation cost (a total of $133,000 per year). For the last five years of the lease, the city will pay $56,000 per year, or $1.25 per sq ft. In this case the rental process made it possible to secure space more quickly because capital budget approval was not involved.

The Philadelphia Board of Education has successfully converted several old buildings, including a supermarket, a warehouse-loft building, and a former arsenal to school use. All the buildings were purchased, except the arsenal which was a gift from the federal government. The school department has consistently found conversion costs to be lower than new construction costs.

In 1968, the school department was able to take over the Frankford Arsenal Gauge Building, a heavy-industrial building, adjacent to a recreation center, a public library, and an elementary school, and just several blocks from the overcrowded Olney High School. The subsequently renovated building, operated as a completely autonomous secondary school for 300 students in grades 10-12, has helped to relieve pressure on Olney High.

The heavy masonry building is structurally sound. Originally, the interior featured high ceilings, loft-like spaces, heavy circular columns, and many windows. Renovation took 9-10 months to complete; the job involved gutting, repartitioning, and refinishing the interior; installing carpeting, additional plumbing and electrical fixtures; rewiring, and generally meeting fire-code standards for stairwells and corridors. The existing power and waste disposal system as well as the HVAC system were satisfactory.

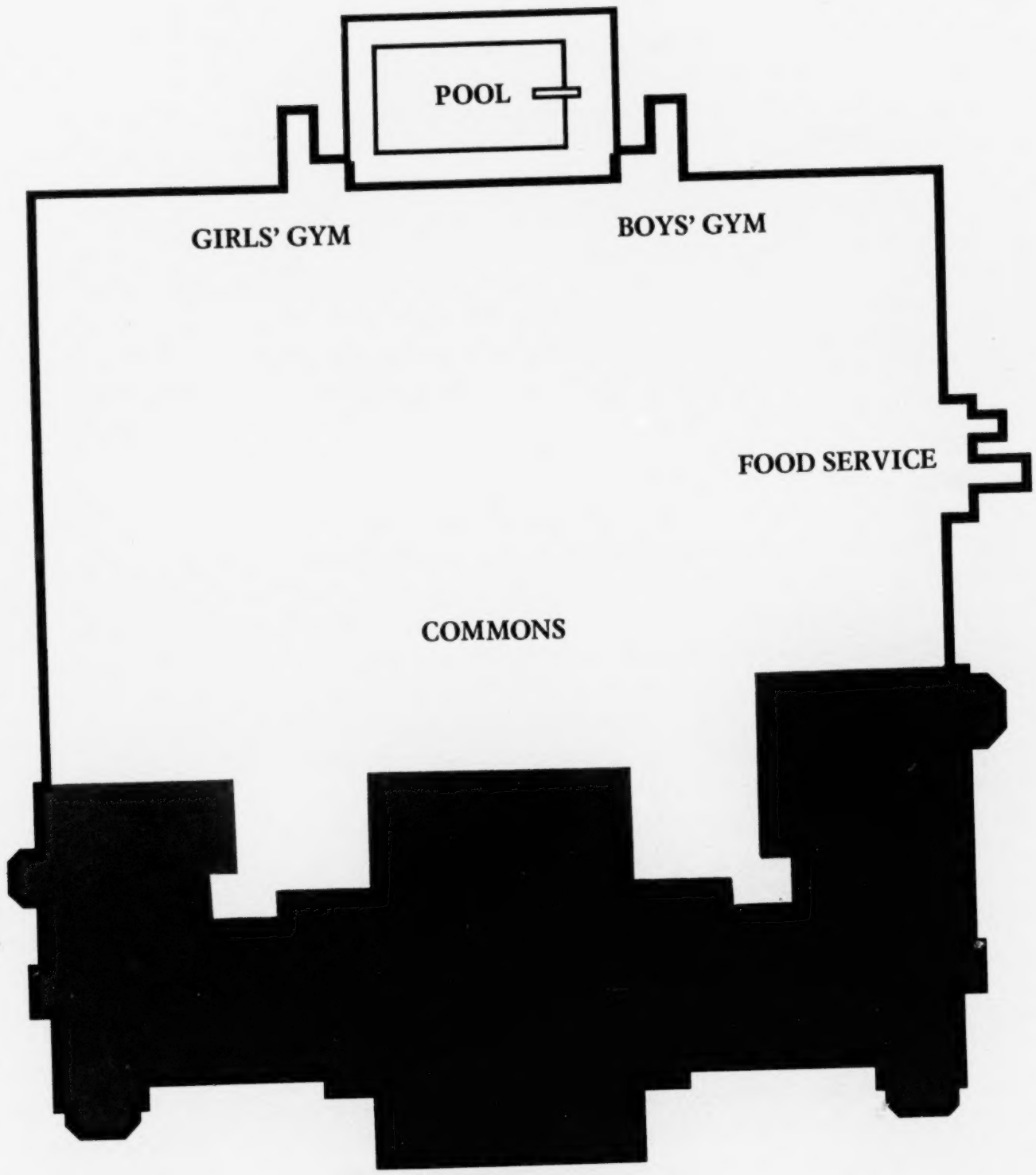
The 81,600-sq-ft school is a complete high school except for shop facilities. It includes 20 general purpose classrooms, 2 science labs, 3 business education rooms, 3 art labs, a home economics suite, a graphics area, a health education room, an instructional materials center, a little theater, and an area for food service and dining. Gym

7

Typical Portland middle school conversion opens up ground floor plan of existing building by using the old gym as a resource center and removing classroom walls. New gyms and pool are located so that they can be used by the community without opening up the whole school.

8

nversion
ing
esource
lls.
hat they
bout



space was provided by converting an adjacent high-ceiling garage into a 3,600-sq-ft recreation/physical education room, plus lockers.

The total conversion cost was $547,500, or $6.70 per sq ft. Dr. Glen I. Earthman, Director of the Philadelphia School District Facilities Department, estimated that it would have cost $32 to $35 per sq ft to construct an equivalent new building on the same site.

A similar conversion involving a six-story warehouse, which was purchased and renovated for use as a demonstration school and computer center, cost only $9.55 per sq ft. The job included gutting and repartitioning and the installation of lighting, carpeting, and a new ceiling. In general, Philadelphia's experience with conversions has revealed average costs of $12 per sq ft or less, including both acquisition and rehabilitation. Encouraged by past success, the Philadelphia School Department is looking for several more buildings to convert.

The Chicago School Department has more than 12 years' experience with factory and warehouse conversions. In 1958, the department modernized a 50-year-old factory and its adjoining offices —about 620,000 sq ft—to house the Washburn Trade School, which has a present enrollment of 3,300 students. In 1964, the city bought a wholesale grocery warehouse and garage for $1. The resulting 264,000 sq ft of converted space now houses 1,480 students at St. Simeon Vocational High School. Since 1965, a former candy factory has provided space for the Westinghouse Vocational High School, a comprehensive high school, a Head Start program, and an adult education program. This building provides 400,000 sq ft of space.

All the above buildings were reinforced concrete structures that required extensive remodeling. The interiors were gutted completely. New services—plumbing, heating, electrical, fire alarm systems—were added, and new interior partitioning installed.

The renovation costs of these buildings have been fairly low, ranging from $6 to $12 per sq ft. Washburn Trade was acquired for $1.6 million, and the cost of modernizing it was about $2.3 million. The total development cost was therefore about $7 per sq ft. Development costs for St. Simeon were about $1.6 million, or about $6.50 per sq ft. The conversion cost of the Westinghouse Building, acquired for $750,000, was about $12 per sq ft.

2 THE FULLY USED SCHOO

Where school enrollments are ra
are often quickly overwhelmed. I
is simply not available, or will n
Planners facing this crisis have t
more students.

This action implies no drop
in the student-teacher ratio, and
double session approach which m
adopted. Double sessions mean t
assigned involuntarily to one or t
double sessions is that they tend
down to its bare essentials. Each
and there is little time—if any—
morning session must finish up
afternoon session; the afternoon
students from staying around, es

There are two broad avenu
accommodating more students in
extended school day and the exte
has a large number of possible va
has fewer complications and ca
while the extended year is more
for planning. However, the exte
for maximum use of existing capa

The Extended School Day

The rationale behind the extende
haven't enough classrooms availa
course meetings in a normal high
30 or 35 students per class, whi
one or two periods, thereby fittin
class size at a desirable level.

For instance, a classroom in
day will accommodate 6 × 25 =
operating on an eight-period day

ceiling garage
om, plus lockers.
6.70 per sq ft.
School District
e cost $32 to $35
n the same site.
ehouse, which
tration school and
included gutting
arpeting, and a
with conversions
ncluding both
success, the
eral more buildings

nan 12 years'
s. In 1958, the
ts adjoining offices
Trade School, which
4, the city bought
The resulting
0 students at St.
mer candy factory
nal High School,
n, and an adult
00 sq ft of space.
rete structures that
e gutted completely.
alarm systems—
d.
been fairly low,
e was acquired for
about $2.3 million.
$7 per sq ft.
6 million, or about
ghouse Building,

2 THE FULLY USED SCHOOL

Where school enrollments are rapidly increasing, school capacities are often quickly overwhelmed. In many cases, money for new schools is simply not available, or will not be available for some time. Planners facing this crisis have to make existing schools accommodate more students.

This action implies no drop in educational standards, no change in the student-teacher ratio, and no desire to institute the typical double session approach which many desperate school systems have adopted. Double sessions mean two separate sessions with students assigned involuntarily to one or the other. The basic trouble with double sessions is that they tend to strip the educational program down to its bare essentials. Each individual's school day is compressed, and there is little time—if any—for after-school activities. The morning session must finish up promptly and make way for the afternoon session; the afternoon session ends so late as to discourage students from staying around, especially if it is already dark.

There are two broad avenues of approach to the problem of accommodating more students in the same amount of space: the extended school day and the extended school year. Each alternative has a large number of possible variations. In general, the extended day has fewer complications and can be implemented very quickly, while the extended year is more complex and requires a longer period for planning. However, the extended year has a greater potential for maximum use of existing capacity.

The Extended School Day

The rationale behind the extended day goes something like this: you haven't enough classrooms available to schedule all the required course meetings in a normal high school day—not without going to 30 or 35 students per class, which you don't want to do. So you add one or two periods, thereby fitting in everyone and keeping the average class size at a desirable level.

For instance, a classroom in continuous use during a six-period day will accommodate $6 \times 25 = 150$ students. The same classroom operating on an eight-period day will accommodate $8 \times 25 = 200$

students. This represents a one-third increase in scheduling capacity.

However, a word of caution. At this point the scheduling difficulties are resolved, but the overcrowding of supporting facilities remains. In an eight-period day all students are likely to have two—and many will have three—free periods. This is a situation which can create boredom and tension if students are not given alternatives to the traditional study hall, and if administrators try to impose tight controls on their behavior.

To avert this problem, many school administrators have implemented a staggered schedule, permitting students who would otherwise be assigned to study halls to report to school late or to leave early. In this way, overcrowding is relieved, but only at the beginning and the end of the school day.

A more effective approach to the problem is to combine the staggered schedule with the open campus plan, which will be discussed later in greater detail. Under the open campus concept, students with free periods are not confined to study halls, but instead may choose among a number of locales and activities, either within the school or outside it. In this way, both problems—overcrowding and the restlessness of students with time on their hands—can be overcome.

There is one particular variation on the extended school day which deserves special mention: the use of schools during the late afternoon and early evening. This is the time of the day—between the normal high school program and any adult education program which may be in operation—when schools are least used.

For the vast majority of high school students, as well as their parents and teachers, this could be a rather inconvenient time to attend school. The point is not to overlook the possibility that such a schedule would be desirable and even advisable for some students.

This is not a kind of double session where the student body is split in half and students are assigned involuntarily to one schedule or another. For instance, the Urban High School gets under way in Las Vegas, Nevada, at four p.m. daily. Four O'Clock High, as it is called, is the late afternoon counterpart of Valley High School and shares the same building. What distinguishes Urban High from the numerous evening schools in the country is that its students are not adults, but high school age youngsters.

ne-third increase in scheduling capacity.
tion. At this point the scheduling
he overcrowding of supporting facilities
ay all students are likely to have two—
ree periods. This is a situation which can
f students are not given alternatives to
l if administrators try to impose tight

many school administrators have
edule, permitting students who would
ly halls to report to school late or to
rcrowding is relieved, but only at the
school day.
ach to the problem is to combine the
open campus plan, which will be discussed
the open campus concept, students with
to study halls, but instead may choose
nd activities, either within the school
th problems—overcrowding and the
time on their hands—can be overcome.
r variation on the extended school day
tion: the use of schools during the late
. This is the time of the day—between the
and any adult education program which
schools are least used.
f high school students, as well as their
uld be a rather inconvenient time to attend
verlook the possibility that such a schedule
n advisable for some students.
ouble session where the student body is
e assigned involuntarily to one schedule or
Urban High School gets under way in
p.m. daily. Four O'Clock High, as it is
n counterpart of Valley High School and
What distinguishes Urban High from the
s in the country is that its students are not
youngsters.

The 600 members of Urban High's student body helped to put the curriculum together, and it reflects their needs. There are several reasons why students choose to enroll at Urban High. Some simply want to work and still have a chance to finish high school. Some find themselves unable to adjust to the regimen of the normal school. A few want to attend school because their parents work at night and in this way the family can be together during the day. In any case, all of the students are volunteers.

Las Vegas is an expanding community in need of additional school space. Urban High was undertaken only in part as an answer to overcrowding. Its primary purpose was to provide a more convenient and amenable choice for a small number of working students. Its success has led the school administration to consider expanding the program to two more schools. In this way, Las Vegas could add 1,800 seats to its high school capacity without building a new school, thus saving about $10 million.

In Portland, Oregon, Adams High School has begun a program similar to Urban High's, though on a more modest scale. Adams is a Title I school with a large number of students from poor families. A special program, which begins at four p.m., responds to the needs of high school students who would otherwise drop out. In general, these students are working full-time and have had difficulty in adjusting to the usual high school atmosphere and curriculum. The program is tailored specifically to their needs and is less academically oriented than the day school.

About 30 students are now enrolled. The school administration is interested in expanding the program because these students and their teachers have responded so favorably. What has particularly encouraged the faculty is the sense of identification which these previously alienated students feel towards the program.

The experiences of Urban High and Adams High indicate that among high school students and high school dropouts exists a clientele for late afternoon and evening schools. Although in any school system there may be only a modest percentage of students who would be involved, the total number, particularly in a medium or large city, could equal the enrollment of one or more high schools.

The large cities are beginning to take notice of the possibilities

inherent in late afternoon and evening schools. For instance, the urgent need to find additional high school seats has prompted Superintendent James F. Redmond of Chicago to examine the possibility of running classes up to 10 p.m. at selected schools.

In severely overcrowded New York City, Chancellor Harvey Scribner has suggested evening or night sessions in each high school. This idea has also been suggested by a committee on high schools composed of school administrators and consultants.

The Extended School Year

There are many ways to operate schools year-round. The most familiar use summer terms for remedial or make-up work or for acceleration. Many of these schemes are valuable and essential from the educational point of view, but few of them offer significant cost-savings as well.

Valley View School District Number 96, in Illinois, shows how a good deal of money can be saved—and additional seats provided promptly—through a 12-month school year. Valley View is a K-8 district located near Joliet, Illinois.

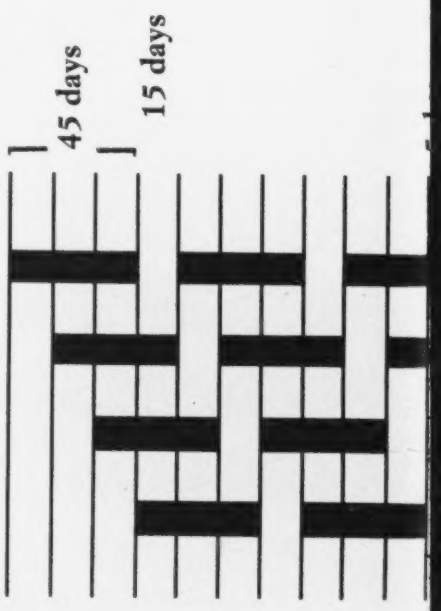
Valley View officials resorted to year-round schooling when confronted with a population explosion that took place so quickly that there was simply not enough time to plan and construct new schools before the capacities of existing schools were exceeded. In 1953, there were 89 pupils in Valley View; by 1970 there were 5,590, and the numbers continue to mount. It is estimated that by 1980 there will be 22,000.

To meet this crisis, Valley View implemented its distinctive 45-15 Continuous School Year Plan on June 30, 1970. The plan has the following basic characteristics:

1. The student population is divided into four groups. Each group attends school for 45 class days and then has 15 class days of vacation. The district determines which group a pupil will be assigned to. It must be emphasized that Valley View's plan is compulsory; parents are not allowed to choose a group for their children.
2. Each group has four 45-day sessions per year, thus fulfilling the 180 school days per year requirement.
3. The starting dates for the
intervals. In this way, when
first group was just going on
time only three of the four g

Thus, the capacity of each
For instance, a school with a ca
750 pupils at any one time. But
are accommodated, and all pup
attention as before.

4. In addition to their four
holidays, all pupils have a we
off at Easter and from 7 to 1



Administrators estimate th
district $6 million, an amount e
two 30-room elementary school
so successful that it will be appli
built. So for every three school
will give the district the equival

ols. For instance, the
eats has prompted
cago to examine the
at selected schools.
ity, Chancellor Harvey
sions in each high school.
nittee on high schools
sultants.

r-round. The most
make-up work or for
uable and essential from
em offer significant

96, in Illinois, shows how
ditional seats provided
r. Valley View is a K-8

round schooling when
aat took place so quickly
lan and construct new
hools were exceeded. In
; by 1970 there were 5,590,
stimated that by 1980

emented its distinctive
ne 30, 1970. The plan has

to four groups. Each group
has 15 class days of
n group a pupil will be
Valley View's plan is
choose a group for their

per year, thus fulfilling the

3. The starting dates for the four groups were staggered at 15-day intervals. In this way, when the fourth group was starting, the first group was just going on vacation. This means that at any given time only three of the four groups are in school.

Thus, the capacity of each school has been increased by one-third. For instance, a school with a capacity of 750 would continue to serve 750 pupils at any one time. But over the school year 1,000 pupils are accommodated, and all pupils receive just as much time and attention as before.

4. In addition to their four 15-day vacations and the usual legal holidays, all pupils have a week off at Christmas, another week off at Easter and from 7 to 11 days off around July 4th.

11

Administrators estimate that so far the 45-15 plan has saved the district $6 million, an amount equivalent to the cost of building two 30-room elementary schools. They believe that the plan has been so successful that it will be applied to any new schools that may be built. So for every three schools built in the future, the 45-15 plan will give the district the equivalent of four.

And three schools will not need as many administrators, custodians, or cafeteria employees as would four. For this reason, Paul F. Swinford, Assistant Superintendent, estimates that year-round schools will save $80,000 a year in salaries.

Valley View finds that operating schools year-round does not affect the total cost of teacher salaries. Each pupil still attends school for 180 days a year, and teachers are paid according to how many days a year they work. Thus, some teachers are being paid more because they have elected to work more than 180 days. But the net cost in teacher salaries to the district is the same as it would have been on a regular school year with an extra schoolhouse.

Valley View also believes that significant cost savings will be realized because textbooks, audio-visual items, and classroom furniture are shared by a larger number of students, thus cutting back on the need for additional purchases.

Year-round schools have generated some additional expenses, but these are negligible when contrasted with the savings. Obviously, greater use of school buildings means more wear and tear, resulting in higher maintenance costs. But school building costs such as insurance—not to mention the basic investment—remain fixed regardless of the degree of use.

12

Traditional Objections to Year-Round Schools and Valley View's Answers

---

1 Objection:
A summer vacation period for all youngsters is a long-established tradition. Community recreational programs are organized to exercise their maximum efforts during the summer.

Answer:
Because youngsters tend to become bored long before the end of the three-month summer vacation, shorter and more frequent vacations are preferable. Moreover, recreational facilities tend to be over-used during the summer and under-used during the rest of the year. Valley View's 45-15 plan spreads the burden on recreational resources evenly over the year, and each student has a vacation during each season. Since facilities are less crowded, children get more use and enjoyment out of them. Valley View recreational authorities have cooperated by

gearing their progr

Another impo
in the same family
schedule. In this w
and children can p

2 Objection:
Teachers will not v

Answer:
Under the Valley V
days or up to as m
borne out by the s
formerly recruitin

3 Objection:
Children transferr
tional lines cannot

Answer:
With four groups
likely that a child c
year can be placed
that point.

Even more i
who fails during
joining the group
tern. Thus, he wil
have lost only 45

4 Objection:
Year-round use of

Answer:
On the contrary,
in the number of
given neighborho
vacation at the sa
district's pupils w

Thus, Valley
buses which sit id
they work a longe
them the total p
month schedule.

need as many administrators,
s as would four. For this reason,
rintendent, estimates that year-round
n salaries.
ating schools year-round does not
ries. Each pupil still attends school
are paid according to how many days
chers are being paid more because
han 180 days. But the net cost in
he same as it would have been on a
schoolhouse.
at significant cost savings will be
o-visual items, and classroom
umber of students, thus cutting back
ses.
nerated some additional expenses,
trasted with the savings. Obviously,
eans more wear and tear, resulting
t school building costs such as
basic investment—remain fixed

Round Schools

---

all youngsters is a long-established
nal programs are organized to exercise
e summer.

ome bored long before the end of the
shorter and more frequent vacations
ational facilities tend to be over-used
sed during the rest of the year. Valley
urden on recreational resources evenly
nt has a vacation during each season.
, children get more use and enjoyment
ational authorities have cooperated by

gearing their programs and facilities to the 45-15 schedule.

Another important aspect of school vacations is that all children in the same family and in the same neighborhood are put on the same schedule. In this way, parents can plan vacations for the entire family, and children can play with their neighborhood friends.

2 Objection:
Teachers will not want to lose their summer vacations.

Answer:
Under the Valley View plan, teachers may elect to teach the usual 180 days or up to as many as 225 days. The popularity of this approach is borne out by the surplus of applicants for teaching positions, whereas formerly recruiting was a problem.

3 Objection:
Children transferring from a school system which operates on traditional lines cannot be fitted conveniently into a year-round program.

Answer:
With four groups at four different stages of instruction, it is more likely that a child coming into the system at any time during the school year can be placed at a level commensurate with his progress up to that point.

Even more important, under the Valley View 45-15 plan a pupil who fails during one 45-day term has a chance to make up work by joining the group immediately behind his own in the scheduling pattern. Thus, he will recover the ground he has just gone over, and will have lost only 45 days—not a year.

4 Objection:
Year-round use of school buses will increase transportation costs.

Answer:
On the contrary, Valley View's plan permits a one-fourth reduction in the number of buses. This results from putting all the children in a given neighborhood on the same schedule so that they will be on vacation at the same time. And, at any one time, one-fourth of the district's pupils will be on vacation.

Thus, Valley View does not have a sizable investment in school buses which sit idle for three months each year. As for the bus drivers, they work a longer year, but since there are proportionately fewer of them the total payroll remains about the same as under the nine-month schedule.

5 Objection:
State aid to local school districts is based on the traditional nine-month school year.

Answer:
Valley View found strong support for the 45-15 plan among state officials and legislators. The Illinois State Assembly passed a law authorizing the Superintendent of Public Instruction to determine an equitable procedure for apportionment of state aid to school districts operating on an approved 12-month schedule.

Year-Round Schools: Some Other Observations

Valley View's year-round schedule could not have been put into effect without the support of the community. However, that support might not have appeared if the district had not been faced with a financial crisis.

Not many other communities have adopted a full-scale year-round plan. The Francis Howell School District, in the St. Louis, Missouri, metropolitan area, has put all its elementary schools on a mandated year-round schedule. This decision followed a one-year experiment with the schedule at a single school. As was the case in Valley View, the Francis Howell District faced a rapidly growing enrollment at a time when it was in debt to its legal limit. The administrators estimated that more than $1 million in new school construction would have been spent over the next five years. Now, the only increased expenses expected for the year-round schedule are for building maintenance.

Other districts using some form of year-round schedule are Jefferson County (Louisville, Kentucky) and Hayward, California.

In communities that do not face a financial pinch, there appears to be great reluctance to adopt what amounts to a radical departure from the traditional school year, even when it is shown that the immediate savings on capital outlay could be substantial.

For instance, the Utica Community School District, located about 20 miles outside Detroit, Michigan, recently completed a feasibility study on a four-quarter, year-round schedule, with mandated enrollment. Utica has growth problems similar to those of Valley View and the Francis Howell District. Utica school

administrators predict that t
will climb to 50,000 by 198
would mean the addition of
highs, and 3 senior highs ov

But, by operating all th
schools and projected school
year-round schedule, only a
highs and 2 senior highs wo
could save nearly $100 milli
10 years, says George D. Gl
school study.

When the year-round p
them rejected it, despite the
familiar nine-month school y
preferred to spend the extra

As a result of his study
a period of very careful plan
interested in year-round sch
three years to assemble info
community, and restructure
believes, several more years
before the year-round sched
By contrast, Valley View au
study of year-round operati

Year-round schedules
cities. But in view of the det
finances, some interest in th
School administrators in Ch
possibility of starting year-r

What remains to be de
saved in the long run by ope
novelty wears off, it is not in
that programs and facilities
students who have "no scho
spring. If such demand sho

on the traditional nine-

45-15 plan among state
Assembly passed a law
Instruction to determine
of state aid to school dis-
chedule.

ions

have been put into
. However, that support
ot been faced with a

pted a full-scale
District, in the St. Louis,
lementary schools on a
n followed a one-year
ool. As was the case in
ced a rapidly growing
ts legal limit. The
million in new school
e next five years. Now, the
ar-round schedule are

ar-round schedule are
nd Hayward, California.
ncial pinch, there appears
ts to a radical departure
h it is shown that the
be substantial.
chool District, located
recently completed a
und schedule, with
roblems similar to those of
ict. Utica school

administrators predict that the present school population of 23,000 will climb to 50,000 by 1981. Under normal circumstances, this would mean the addition of another 19 elementary schools, 4 junior highs, and 3 senior highs over the next decade.

But, by operating all the district's schools—both existing schools and projected schools—on a mandated, four-quarter, year-round schedule, only another 9 elementary schools, 2 junior highs and 2 senior highs would be needed. Consequently, the district could save nearly $100 million in construction costs over the next 10 years, says George D. Glinke, director of Utica's year-round school study.

When the year-round plan was presented to the voters, 80% of them rejected it, despite the savings, preferring to stay with the familiar nine-month school year. Apparently, in this case the voters preferred to spend the extra money.

As a result of his study, Glinke strongly emphasizes the need for a period of very careful planning on the part of school districts interested in year-round schools. He estimates that it would take over three years to assemble information, communicate the plan to the community, and restructure the curriculum. Even after that, he believes, several more years should be devoted to a pilot project before the year-round schedule is adopted on a system-wide basis. By contrast, Valley View authorities devoted two years to a thorough study of year-round operation before implementing their 45-15 plan.

Year-round schedules have not yet been tried out in major cities. But in view of the deteriorating condition of urban school finances, some interest in the year-round concept has been aroused. School administrators in Chicago and New York are considering the possibility of starting year-round programs in selected schools.

What remains to be demonstrated is whether money will be saved in the long run by operating schools the year round. After the novelty wears off, it is not inconceivable that a community will insist that programs and facilities be provided at public expense for the students who have "no school" in the autumn, in the winter, or in the spring. If such demand should develop, costs could return to normal.

3 HELPING STUDENTS GROW WINGS

Among the more intriguing (and also the more immediately productive) alternatives are the programs built around the idea that students do not have to spend all their time inside a school facility in order to be educated. In this sense, "helping students grow wings" means making responsibility and self-discipline a part of the educational process.

Open Campus Schools

The term "open campus" refers to high schools that permit students to move freely inside and outside school when they are not scheduled for a class. Assigned study halls and passes are eliminated, and students are free to go to the library, study quietly, meet with friends, do projects, eat snacks, or leave school when they do not have a class.

A substantial number of high schools have adopted, or are in the process of adopting, an open campus plan. Two basic reasons underlie the current popularity of the open campus approach. First, open campus helps to relieve overcrowding and helps to make needed classrooms available. Second, open campus can humanize school and broaden the scope of secondary education.

Open campus is usually combined with an extended school day in order to allow a school administration to use a building efficiently in the face of severe overcrowding. Open campus can effectively increase the operating capacity of a school building.

Consider the following hypothetical example:

A fictitious Central High School with a capacity and enrollment of 1,000 is planned for 85% use at capacity, and has 48 teaching stations. It has an average of 25 students per class. Each student has 5 class meetings per day, and the school day is 7 periods long.

The following formulas show how many students are in class and how many have a free period at any one time.

$$\frac{\text{5 class periods x 1000 students}}{\text{7 periods per day}} = \textit{714 students in class during any given period}$$

$$\frac{\text{2 free periods x 1000 students}}{\text{7 periods per day}} = \textit{286 students free during any given period}$$

INGS

he more immediately
ams built around the idea
heir time inside a school
sense, "helping students grow
nd self-discipline a part of

n schools that permit students to
when they are not scheduled for
s are eliminated, and students
tly, meet with friends, do
nen they do not have a class.
ools have adopted, or are in the
lan. Two basic reasons underlie
npus approach. First, open
and helps to make needed
mpus can humanize school and
tion.
d with an extended school day
ion to use a building efficiently
pen campus can effectively
hool building.
xample:
with a capacity and enrollment
pacity, and has 48 teaching
nts per class. Each student has
ol day is 7 periods long.
ow many students are in class
ny one time.

714 students in class during any given period

286 students free during any given period

Notice that with an average of 714 students in class, fewer than 30 of the school's 48 teaching stations will be in use (at 25 students per class) at any one time. If the 286 students with a free period are not assigned to the remaining 18 stations for study purposes (but instead are in the library or in the cafeteria/lounge, or are outside the school altogether), then many of these stations can be used to accommodate additional students beyond the 1,000.

If the school day is extended to 9 periods, each student still has 5 classes a day, but he now has 4 free periods. This changes the distribution of students within the school.

$$\frac{5 \text{ class periods} \times 1000 \text{ students}}{9 \text{ periods per day}} = \textit{556 students in class during any given period}$$

$$\frac{4 \text{ free periods} \times 1000 \text{ students}}{9 \text{ periods per day}} = \textit{444 students free during any given period}$$

Obviously, the school's classrooms can accommodate many more students, but the big problem is how to handle the very large number of students who are free each period.

Here is where the off-campus phase of open campus becomes essential. If Central High is to function effectively with over 400 students free each period, it has to permit students to leave the school when not assigned to a class. Operating in this way open campus can raise the capacity of a school by roughly 25%.

Jones High School, Beeville, Texas, has raised its capacity of 970 students to over 1,200 as a result of an extended day schedule combined with an open campus plan. Open campus was first instituted at Jones in 1963 after a careful public relations campaign to prepare the town and parents for the change. Many students leave school during their free periods; however, more than half of the Jones students take an extra (sixth) course for credit during one of their free hours, thus enriching their experience over four years.

Lawrence High School in Falmouth, Mass., instituted the open campus plan in 1968-69 when faced with the problem of housing 1,200 students in a building designed for 950. Study halls were abolished except on a voluntary basis, and the cafeteria was made available as a student lounge. Lawrence decided to use the auditorium to offer a variety of programs such as films, speakers, panel

discussions, and folk singing. Students may use any of these facilities or leave school during their free periods. This enabled 1,200 students to be accommodated, and so increased the capacity of Lawrence High by 26%.

Winchester, Mass., a residential community of 20,000 located outside Boston, resorted to a combination of extended school day and open campus in order to deal with a serious overcrowding problem. Winchester High's facilities were designed for 950 students; 1,160 are now enrolled under the open campus plan. The school provides ungraded non-credit mini-courses on a wide variety of topics of interest to students, and teachers volunteer for these courses at no extra pay.

School administrators who have worked with an open campus plan are in general agreement that it produces a relaxed school atmosphere conducive to learning. Open campus reduces the teacher's custodial role, permitting him to function more effectively in his professional capacity. The teacher is seen as less of a threatening figure and more of a partner in the learning process. The result is an improvement in teacher-student relationships.

Students have shown a marked improvement in attitudes and a greater self-direction and self-responsibility. Brookline, Mass., reported a decline in vandalism after the introduction of open campus. Lester W. McCoy, principal of Jones High in Beeville, Texas, would not return to a conventional school program, even if new construction made that possible. Says McCoy, "We have found the educational benefits to be so great and the student's attitudes and responsibility to be so much better than on the old system that we would not go back to it." Beeville has been operating an open campus for eight years. Holland High School in Holland, Michigan, has also had an open campus plan in effect for the last eight years. Principal Fred S. Bertsch, Jr. says, "I don't think any of us here would want to go back to the concentration camp." In spite of the relaxation of discipline, student grades seem to be unaffected by open campus. Students perform pretty much as they did before.

Perhaps the biggest hurdle that proponents of open campus plans have to surmount is the reluctance of adults, both in and out of the high schools, to abandon a disciplined high school schedule.

However, after an initial p
community reactions are g
Center for Field Research a
evaluated responses to the
School. The Center found t
believed the climate in the
on the issue. Teachers who
years tended to see little or
time at the school agreed w
to favor the program three
Mass., showed a majority o
open campus program at th

Another major featur
periods offer students an o
their education through vo
in some open campus progr
courses during their free pe

In implementing thes
campus plan, high schools a
facilities. Although it is im
this type of benefit, it seem
learning opportunities mea
investment in education.

There is nothing impl
requires other than normal
spending a modest amount
effectiveness of the progra

For instance, at Lawr
para-professionals have be
As a result, teachers have b
able to spend more time in
reported spending addition
boxes. But the sums are no
in the capacities of the scho

Cities are likely place
programs. A city abounds i
open campus a success, and

y of these facilities
bled 1,200 students
of Lawrence

of 20,000 located
nded school day
ercrowding
ed for 950
campus plan. The
on a wide variety of
eer for these

h an open campus
laxed school
reduces the
on more effectively
less of a threatening
ss. The result is

nt in attitudes and a
okline, Mass.,
ction of open campus.
eville, Texas, would
en if new construction
d the educational
s and responsibility
we would not go
campus for eight
an, has also had an
rs. Principal Fred S.
would want to go back
xation of discipline,
campus. Students

ts of open campus
lts, both in and out of
school schedule.

However, after an initial period of skepticism and distrust, community reactions are generally favorable. In June, 1970, the Center for Field Research and School Services at Boston College evaluated responses to the open campus plan at Brookline High School. The Center found that although students overwhelmingly believed the climate in the school had improved, the faculty was split on the issue. Teachers who had been at the school for a number of years tended to see little or no improvement, while those with less time at the school agreed with the students. Parents were found to favor the program three to one. A similar study done at Winchester, Mass., showed a majority of parents and merchants favorable to the open campus program at the end of the first year.

Another major feature of open campus programs is that the free periods offer students an opportunity for enriching and broadening their education through voluntary learning activities. Students in some open campus programs are allowed to enroll in additional courses during their free periods—either for credit or non-credit.

In implementing these kinds of activities as part of an open campus plan, high schools achieve a more effective use of teachers and facilities. Although it is impossible to assign a monetary value to this type of benefit, it seems clear that an expansion of the scope of learning opportunities means a greater return on the community's investment in education.

There is nothing implicit in an open campus program which requires other than normal expenditures. On the other hand, spending a modest amount of additional money could enhance the effectiveness of the program.

For instance, at Lawrence High a teacher and two para-professionals have been hired to supervise extra programs. As a result, teachers have been freed from custodial duties and are able to spend more time in professional activities. Several schools reported spending additional sums for such items as films and juke boxes. But the sums are not significant compared to the increase in the capacities of the schools.

Cities are likely places in which to conduct open campus programs. A city abounds in facilities and resources needed to make open campus a success, and it has public transportation. Yet many

cities have done very little in this area to date. Boston is about to move in the direction of open campus programs for its high schools. A committee of central administrators, high school headmasters, and planners issued a favorable report on the feasibility of implementing such programs. It recommended that the city seek state approval to begin open campus programs in the fall of 1971.

Home Base Schools

The home base school is not a novel concept. The many schools which operate work/study programs are home base schools in a modest way. Traditionally, there has been a long-standing acceptance of students experiencing part of their education outside the school, so long as a specific vocational purpose is served. What distinguishes the home base concept is its extension to: 1) academic education, and 2) career education through exposure of the student to a variety of activities in the work-a-day world.

Lexington, (Mass.) has about 170 students enrolled in a program called Education Without Walls (EWOW). The program was started in the 1969-70 school year, and is limited to juniors and seniors. The students represent a cross-section of the school population. Some are college-bound, some are not.

16

The purpose of EWOW is to expand the scope of learning experiences available to students by offering credit for a variety of out-of-school activities chosen by the students themselves. Students are encouraged to define their individual educational needs and then to use the resources of both the school and the community in satisfying those needs.

Generally, EWOW students spend from 8 to noon in school, their afternoons out in the community. Out-of-school activities include employment (students work as teacher-aides in Lexington's elementary schools, as garage mechanics, retail store clerks, etc.) or non-paying projects (such as producing films or making guitars).

The 170 EWOW students average about 18 hours per week in school, instead of the customary 27½ hours. In general, this is helpful in relieving overcrowding at Lexington High. More specifically, the participation of EWOW students in out-of-school activities frees five to six classrooms each afternoon.

Students
The only course
English, United
they may elect
interdisciplinar

Students
or skilled perso
Each contract s
student: what
project he will

Beyond o
has a potential
problems must
more effectivel
activities to be
from them.

A substan
attention of on
Lexington and
implement thei
necessarily imp
the use of volu
school day mea
teaching load.

Serious in
school system i
point where th
of students wit
a lack of transp
cities or in tow
Consequently,
students to and

Non School Sch

At the extreme
learning are ex
conventional h

o date. Boston is about
s programs for its high schools.
high school headmasters,
on the feasibility of
mended that the city seek
rograms in the fall of 1971.

ncept. The many schools which
ne base schools in a modest
ng-standing acceptance of
ucation outside the school, so
s served. What distinguishes the
1) academic education, and
e of the student to a variety of

70 students enrolled in a
Walls (EWOW). The program
ar, and is limited to juniors and
ss-section of the school
some are not.
xpand the scope of learning
offering credit for a variety of
e students themselves. Students
dual educational needs and
e school and the community in

pend from 8 to noon in school,
ity. Out-of-school activities
k as teacher-aides in Lexington's
anics, retail store clerks, etc.)
oducing films or making guitars).
erage about 18 hours per week in
7 ½ hours. In general, this is
at Lexington High. More
WOW students in out-of-school
ns each afternoon.

Students are consulted on the content of their school studies. The only courses which they are required to take—by state law—are English, United States history, and physical education. Otherwise, they may elect either standard high school subjects or the interdisciplinary courses favored in the EWOW program.

Students make contracts with teachers and with the professional or skilled persons who will supervise their out-of-school activities. Each contract stipulates in detail what will be expected of the student: what books he will read, what papers he will write, or what project he will complete.

Beyond offering relief from overcrowding, the home base school has a potential for enlarging a school's capacity. However, scheduling problems must be overcome before this potential can be exploited more effectively. Blocks of time must be long enough for out-of-school activities to become practicable for every student who will benefit from them.

A substantial off-campus educational program will require the attention of one or more full-time administrators. For instance, Lexington and San Mateo have assigned full-time coordinators to implement their out-of-school programs. However, this does not necessarily imply an increase in total personnel costs. On the contrary, the use of volunteer community resources and persons during the school day means that some teachers will be relieved of part of their teaching load.

Serious implementation of the home base concept may involve a school system in additional expense in one respect. There comes a point where the ability of the schools to satisfy the needs and desires of students with outside educational opportunities is restricted by a lack of transportation (although this may not be a problem in large cities or in towns with convenient public transportation systems). Consequently, additional funds may have to be provided to get students to and from their outside activities.

Non School Schools

At the extreme of the spectrum of using community resources to aid learning are experimental programs which have abandoned the conventional high school entirely. These programs are using

community resources as their classrooms and curriculum. Students must in this sense have "wings" in order to get to and from their classes. Students spend less than half their time at their home base. And since the community makes available many of the facilities normally designed into the traditional school, the home base need not be a school at all in the conventional sense. It may be whatever inexpensive and easily convertible space lies at hand, such as an unused warehouse or office building.

The most notable examples of the nonschool approach are Philadelphia's Parkway Program and Chicago's Metro High School. Both programs began as direct responses to the problem of overcrowded schools and no funds to build new ones. However, an additional objective has been to create an alternative to the traditional high school, based in large part on the conviction that students can and should participate in the process of educational decision-making, and that the community can be the setting for the educational process.

In all essential respects, the Parkway and Metro programs are similar. Parkway was begun in February, 1969, and helped to inspire Metro, which began a year later.

In both programs, students are chosen at random, so as to represent a cross-section of the city's high school population. The popularity of Parkway and Metro among students in Philadelphia and Chicago is indicated by the enormous excess of applications over available openings. Since its inception, Parkway has had about 15,000 applicants for its 500 places. Last fall, Metro had 3,000 applicants for 200 places. Metro now enrolls 325.

Parkway has a separate home base for each of its several autonomous units (there are no more than 180 students to a unit). Metro's home base is located in an office building in the downtown Loop area of Chicago. The home bases act as a headquarters and meeting places. They are leased office buildings, warehouses, etc., which have been renovated.

The cost of a home base varies widely. In the case of Parkway, two of the three home bases are leased—at minimal rents. These are located in office buildings. The third, an unused elementary school, is rent-free.

Metro leases about 12,0
of $5,200, including reimburs
But Metro also has rent-free s

In addition to home base
spaces are provided by the co
school system. In this way, Pa
of maintaining expensive scho

In this sense, the progra
building to house their enroll
500-student high school of 60
The cost of such a school woul
on the bonds. Even the annua
be equivalent to the annual fa

Operating costs for these
conventional school. The basi
the ratio of students to full-ti
Metro is about the same as els
teachers is somewhat better t
librarians, counselors, custodi
usual sense, are few. Parkway
—without further cost—of t
equipment of the community
with them.

About half of the 100 co
are given by the nearly 200 in
include such diverse organizat
Electric, the Insurance Compa
and the Urban League. Simila
Chicago business, cultural, an

Participating institution
instruction, or all three. The e
range from assistance in the p
to the planning and teaching o
space, equipment, and person
donating to Parkway and Met
but is impressive—whether n
terms. And, considering the re

ns and curriculum. Students
er to get to and from their
heir time at their home base.
ble many of the facilities
school, the home base need not
nse. It may be whatever
e lies at hand, such as an

nonschool approach are
Chicago's Metro High School.
es to the problem of
build new ones. However, an
an alternative to the
part on the conviction that
the process of educational
nity can be the setting for the

kway and Metro programs are
ary, 1969, and helped to inspire

chosen at random, so as to
high school population. The
ong students in Philadelphia and
excess of applications over
n, Parkway has had about 15,000
. Metro had 3,000 applicants
5.
se for each of its several
than 180 students to a unit).
fice building in the downtown
s act as a headquarters and
buildings, warehouses, etc.,

widely. In the case of Parkway,
ed—at minimal rents. These are
, an unused elementary school,

Metro leases about 12,000 sq ft of office space for a monthly rent of $5,200, including reimbursement for renovation by the landlord. But Metro also has rent-free space for 60 students.

In addition to home bases, most classrooms and other learning spaces are provided by the community, at little or no cost to the school system. In this way, Parkway and Metro avoid most of the cost of maintaining expensive school buildings, equipment, and grounds.

In this sense, the programs have saved the cost of a school building to house their enrollments. For Parkway this would be a 500-student high school of 60,000 sq ft (at 120 sq ft per student). The cost of such a school would be $2.4 million, plus annual interest on the bonds. Even the annual interest paid on such a sum might well be equivalent to the annual facilities cost of the Parkway Program.

Operating costs for these programs are about the same as in a conventional school. The basic operating costs for salaries and the ratio of students to full-time professional staff in Parkway and Metro is about the same as elsewhere. The ratio of students to teachers is somewhat better than elsewhere, but there are no librarians, counselors, custodians, etc., and administrators, in the usual sense, are few. Parkway and Metro have the additional benefit —without further cost—of the teaching services, facilities, and equipment of the community institutions which volunteer to associate with them.

About half of the 100 courses offered by the Parkway Program are given by the nearly 200 institutions which participate. These include such diverse organizations as the Franklin Institute, General Electric, the Insurance Company of North America, the Drama Guild, and the Urban League. Similarly, Metro enjoys the services of 56 Chicago business, cultural, and community organizations.

Participating institutions may provide space, equipment, instruction, or all three. The extent of participation in curriculum may range from assistance in the presentation of a single learning unit to the planning and teaching of an entire course. The value of the space, equipment, and personnel time which these organizations are donating to Parkway and Metro cannot be appraised with precision, but is impressive—whether measured in dollars or in educational terms. And, considering the relatively small numbers of students

Students at Chicago's Metro High School use city facilities such as the Lincoln Park Zoo.

involved, it is possible that a considerable potential remains to be more fully exploited in cities as large as Philadelphia and Chicago.

Scheduling, student involvement, transportation, and other issues are taking their own particular bent in the Parkway and Metro programs. These programs may not be suitable for all high school students. Many students—and parents—prefer a more structured system of high school education. And not all students can cope with a learning process which imposes on them a heavy obligation for self-direction and self-responsibility.

Resource Centers

Complete new schools, with all of their special facilities, are not only costly but difficult to build, particularly in cities where sites are almost impossible to obtain. Because of the difficulties and long delays in new school construction, overcrowded schools often remain overcrowded for years.

A possible alternative to building conventional new schools is to create a series of resource centers in separate buildings that have no enrollment of their own but draw students from overcrowded existing schools for specific periods of time. By this method, the existing schools become less crowded home base schools. Resource centers normally have a special emphasis—performing and visual arts, ecology, science, communications, etc. They provide programs and facilities that could not possibly be duplicated in every new school unless there is an unlimited budget.

Resource centers need not be accompanied by playing fields or playgrounds, which consume well over half the site of an average school. In addition, such facilities as gymnasiums, auditoriums, and cafeterias can be omitted or curtailed.

Consequently, a much smaller site will be adequate for a resource center than would be the case for a school of comparable capacity. This makes it more likely, particularly in cities, that a site can be found which will not involve dislocation of people or businesses.

In general, resource centers emphasize learning by doing: handling, examining, making things. Since these activities require mostly open, flexible loft-type areas, with few permanent partitions, the design and construction time will be significantly less than for a

typical school. And time means money, esp
½-1½% per month escalation in current c

The same factors that permit a resour
than a conventional school also help to mak
lower. These factors also make it possible t
of non-school buildings as especially appro
A solidly constructed warehouse or factory
space would make an ideal candidate for co
center. This fact is yet another factor which
alternative to regular schools.

Cleveland opened its Supplementary
abandoned warehouse in 1966. The centra
in an urban renewal area made it ideal for a
and it was turned over to the school depart
the warehouse was renovated, its large ope
building was ready for occupancy in a rema
By contrast, under the very best circumstan
school would take a minimum of two years

The cost of renovating the warehouse
$50,000 per year for the six years the cente
operation at the end of the 1971-72 school
warehouse will be torn down, and the cent
away to a new loft-like building.

The Supplementary Education Cente
pupils with new learning experiences not a
home schools. Also, the center serves as a l
integration through the sharing of experien
different neighborhoods.

Included among the center's facilities
listening and practice rooms, a model coun
and a cafeteria. Among the activities made
of astronomy, space science, meteorology,
the presentation of concerts by professiona
production of slides and films.

The center's program is designed part
sixth grade students. Each school day, abou
students, drawn from both public and par

ntial remains to be
lphia and Chicago.
rtation, and other
e Parkway and Metro
for all high school
r a more structured
idents can cope with a
y obligation for

facilities, are not only
s where sites are
iculties and long delays
ols often remain

tional new schools is to
uildings that have
from overcrowded
this method, the
se schools. Resource
forming and visual
ey provide programs
ated in every new school

ed by playing fields or
e site of an average
ms, auditoriums, and

e adequate for a
hool of comparable
y in cities, that a site can
people or businesses.
arning by doing:
se activities require
permanent partitions,
icantly less than for a

typical school. And time means money, especially in view of the ½-1½% per month escalation in current construction costs.

The same factors that permit a resource center to be built faster than a conventional school also help to make its construction cost lower. These factors also make it possible to consider the renovation of non-school buildings as especially appropriate for resource centers. A solidly constructed warehouse or factory with a good deal of open space would make an ideal candidate for conversion into a resource center. This fact is yet another factor which makes them an attractive alternative to regular schools.

Cleveland opened its Supplementary Educational Center in an abandoned warehouse in 1966. The central location of the warehouse in an urban renewal area made it ideal for a city-wide resource center, and it was turned over to the school department rent-free. When the warehouse was renovated, its large open spaces were left, and the building was ready for occupancy in a remarkably short six months. By contrast, under the very best circumstances, building a new school would take a minimum of two years from submission of bids.

The cost of renovating the warehouse was $300,000. This is $50,000 per year for the six years the center will have been in operation at the end of the 1971-72 school year. At that time the warehouse will be torn down, and the center will move two blocks away to a new loft-like building.

The Supplementary Education Center has been able to provide pupils with new learning experiences not available to them in their home schools. Also, the center serves as a logical setting for racial integration through the sharing of experiences by students from different neighborhoods.

Included among the center's facilities are a planetarium, music listening and practice rooms, a model country store, an auditorium, and a cafeteria. Among the activities made possible are the study of astronomy, space science, meteorology, and urban redevelopment, the presentation of concerts by professional groups, and student production of slides and films.

The center's program is designed particularly for third, fifth, and sixth grade students. Each school day, about 350 elementary grade students, drawn from both public and parochial schools, spend a full

day at the converted warehouse. After regular school hours and on Saturdays, students from all grades are offered an enrichment program.

Due to the scope and richness of its offerings, the Cleveland center's operating costs are about $500,000 per year, including the cost of transporting pupils but not including maintenance. Over 80% of this goes for salaries. The center has a full-time staff of about 70, supplemented by about 30 part-time staff.

However, with 70,000 pupils visiting each year, the operating cost works out to a little more than $7.00 per pupil visit. And this does not take into consideration the visits of teachers and other adults, for whom the center also conducts programs.

Resource centers can be of varying size and expense, depending upon the size of the pupil population served, the educational objectives of the center, and the ingenuity of those involved.

For instance, a resource center in Berkeley, California, called EPOCH (Educational Programming of Cultural Heritage) took over a 5,500-sq-ft building that had been designed originally as a small factory, but in the course of construction the plan was dropped. EPOCH, which in the fall of 1969 was searching for a new home, took advantage of an opportunity to lease the building for $800 per month after it was modified and completed. EPOCH's moving-in cost, including installation of equipment, was under $30,000.

At EPOCH, elementary school children from Berkeley and other Bay Area school districts learn about the cultural heritage of the various races in their communities. EPOCH facilities include a circular demonstration chamber equipped for multi-media presentations, a resource room in which children can operate their own audio-visual equipment, and a mini-museum containing artifacts and displays. Its operating budget is about $10,000 per month.

The Walt Disney School in Chicago, being designed in 1971, will be a resource center in an entirely new building. The Disney will specialize in the communications arts for grades K-8 pupils drawn from their home schools for periods of several weeks. Unfortunately, cost figures for comparison purposes are not yet available, but there is no doubt that it would be prohibitively expensive to separately supply a number of schools with the Disney's elaborate television and other communications equipment and trained personnel.

Implications for Design of Ne

Adopting programs which allo
for a significant part of the sch
for the design of new high sch

Open campus programs
alternatives to the traditional
within a school are the library
student lounge. In the typical
average at one-seventh of the
scheduled for a class during an
should therefore be planned t
of the student body in the cafe
auditorium.

Libraries (or instruction
visual as well as printed mater
campus programs should be ca
of the student body, and prefe
areas for small group study, se
areas. Independent study prog
library space.

Auditoriums in open cam
make more effective use of th
enrichment. Cafeterias should
recreation, perhaps as several
same central kitchen. Large ca
students at one time have bee

Since the library, auditor
campus school will be in use th
included in determining the ca
if these areas have a low utiliz
be considerably less than for a

Falmouth, Massachusett
operate as an open campus sch
in traditional terms—will be
due to the open campus progr
per pupil cost of construction

school hours and on
an enrichment program.
ngs, the Cleveland
er year, including the
naintenance. Over 80%
me staff of about 70,

ch year, the operating
pupil visit. And this
eachers and other
grams.
nd expense, depending
he educational
hose involved.
ey, California, called
ıral Heritage) took over
originally as a small
plan was dropped.
ning for a new home,
building for $800 per
POCH's moving-in cost,
er $30,000.
n from Berkeley and
ne cultural heritage of the
facilities include a
r multi-media
dren can operate their
seum containing artifacts
10,000 per month.
ing designed in 1971,
uilding. The Disney will
des K-8 pupils drawn
al weeks. Unfortunately,
yet available, but there
pensive to separately
's elaborate television and
ed personnel.

Implications for Design of New Schools

Adopting programs which allow students to be out of classrooms for a significant part of the school day can have important implications for the design of new high schools.

Open campus programs require that students be offered alternatives to the traditional study hall. The most likely alternatives within a school are the library, the auditorium, and some kind of student lounge. In the typical high school day of seven periods, an average at one-seventh of the student body, or 14%, will not be scheduled for a class during any one period. An open campus school should therefore be planned to accommodate at least that percentage of the student body in the cafeteria/lounge, the library, and the auditorium.

Libraries (or instructional materials centers containing audio-visual as well as printed materials) in schools designed for open campus programs should be capable of accommodating at least 10% of the student body, and preferably more. Such libraries should include areas for small group study, seminars and talking, and quiet research areas. Independent study programs will probably require additional library space.

Auditoriums in open campus schools should be planned to make more effective use of their potential both for instruction and enrichment. Cafeterias should be designed for both dining and recreation, perhaps as several small cafeteria/lounges served from the same central kitchen. Large cafeteria/lounges containing 100 or 200 students at one time have been found to be noisy and uncomfortable.

Since the library, auditorium, and the cafeteria in an open campus school will be in use throughout the school day, they can be included in determining the capacity of a projected school. Even if these areas have a low utilization rate, the total space required will be considerably less than for a traditional program.

Falmouth, Massachusetts, is building a new high school to operate as an open campus school. Its nominal capacity—as calculated in traditional terms—will be 1,800. However, its actual capacity, due to the open campus program, will be 2,170. This will lower the per pupil cost of construction by $1,000, from $5,390 to $4,470.

A similar case can be made with regard to off-campus programs. Where school officials can reliably anticipate that a given percentage of students will be involved in educational programs outside the school at any one time, they can plan the school for 80% to 90% of the projected student body.

A home base consists of spaces for teachers, students, administrators, and others to keep their belongings, supplies, and records and to meet together for conferences, seminars, or assemblies. To these basic spaces both the school and its community might wish to add a gymnasium, theater/auditorium, arts studios and industrial arts shops, eating facilities, swimming pools, and other recreational facilities, a public library, community meeting rooms and adult education spaces that could be used as school classrooms when necessary, offices for social service agencies, etc. Commercial space could also be included.

The result of such planning is not the traditional schoolhouse but a community center that serves many different purposes for all ages. One of the functions of such a facility is that, during certain hours of the day, week and year, it is used by the rest of the community. Similarly, the other parts of the community—businesses and industries, stores, town recreation facilities, day care centers, etc.—are being used by students as part of their education.

4 NEW WAYS TO BUILD

No matter how many devices ar existing school and community be built. However, new materi efficiency and economy of schoo

The Systems Approach to Scho

The systems approach to buildi process of planning, designing, rational, efficient, economical, One aspect of the systems app building systems. A building sy assemblies or subsystems whic components, form a building. T structural, heating-ventilating- and interior partitions. The par as components; for example, th system include chillers, fans, p distinguishing features of buil

1. Industrialization. A buil techniques of factory prefa standardization for the esse business.
2. Modular Design. A buil repeated dimensional unit s repeated, and so that every c components.
3. Integration. The various designed to fit together prec reducing the time required t
4. Simultaneous Installatio simultaneously to save time

Thus, quickly assembled substituted for the myriad sma slowly put together on site. Th and subsystems does not pred

mpus programs.
iven percentage of
ıtside the school
90% of the

tudents,
supplies, and
ırs, or assemblies.
nity might wish
lios and industrial
ıer recreational
ns and adult
ooms when
ommercial space

al schoolhouse
t purposes for all
luring certain hours
e community.
nesses and
e centers, etc.—
.

4 NEW WAYS TO BUILD

No matter how many devices are found for saving costs by using existing school and community spaces, new schools will still have to be built. However, new materials and techniques can increase the efficiency and economy of schoolhouse construction.

The Systems Approach to School Building

The systems approach to building schools attempts to make the entire process of planning, designing, bidding, and on-site construction as rational, efficient, economical, and technologically modern as possible. One aspect of the systems approach is the development and use of building systems. A building system is a set of integrated building assemblies or subsystems which together, or with the addition of other components, form a building. The most common subsystems are the structural, heating-ventilating-airconditioning, lighting-ceiling, and interior partitions. The parts of a subsystem are generally known as components; for example, the components of an airconditioning system include chillers, fans, pumps, and ducts. The major distinguishing features of building systems are:

1. Industrialization. A building system employs industrial techniques of factory prefabrication, mass production, and standardization for the essentially non-industrialized construction business.
2. Modular Design. A building system is based on a common, repeated dimensional unit so that the same component may be repeated, and so that every component can fit with all other components.
3. Integration. The various components and subsystems are designed to fit together precisely, easily, and quickly, thus greatly reducing the time required to construct a building on the site.
4. Simultaneous Installation. Various components can be installed simultaneously to save time.

Thus, quickly assembled industrialized subsystems are substituted for the myriad smaller pieces that have traditionally been slowly put together on site. The use of industrialized components and subsystems does not predetermine the size or shape of an

individual schoolhouse, since a system can be put together in a variety of ways, depending on particular needs.

Fast-Tracking (Time and Cost Control Methods)

Attempts have been made to systematize not only construction, but other aspects of the school building process, including planning and programming, design, bidding, and working drawings.

In conventional building development, the programming, design, and bidding stages follow each other. Each successive step cannot be taken until the preceding one is finished.

A management technique known as fast-tracking attempts to telescope these pre-construction steps so that they can overlap and save total construction time. In inflationary periods, saved time is saved building dollars. It is possible with fast-tracking to simultaneously be doing preliminary design for one portion of the work, subsystem bidding for another, and working drawings on a third. As soon as rough design requirements are blocked out, subsystems may be bid. This means that contracts may be let for portions of the work rather than all at once.

22

Because the architect must be able to anticipate what will be happening at any given point in time, careful control must be kept of all phases. This requires careful coordination and decision-making; rather than step-by-step scheduling, every portion of every task must be initially scheduled from the first through the final day. Decisions at each stage become irrevocable.

The first major success with fast-tracking a school occurred in Athens, Georgia, in 1966. Two elementary schools took only 188 days to design, bid, and construct. The architects, Heery & Heery, believe that even a 200,000-sq-ft high school should take not more than 15 months to design and build.

That same year, Toronto's Study of Educational Facilities (SEF) began developing user requirements for schools at all grade levels. These were then translated into performance specifications for subsystems. The Metro Toronto School Board was then ready to solicit industry's help in organizing existing skills, technology, and capital resources for modern efficient production. Bids were taken on subsystems fulfilling performance specifications. In 1969, SEF bid

subsystems represe
detailed analysis w
interfacing of each
the best overall val

Toronto's ma
education and to p
greater responsive
SEF's objectives w
increase value, to
and to reduce oper

Toronto feels
money. The schoo
to build traditiona
equal to those it w

The first SEF
seven months inst
The average const
been 8½ months.
this year Toronto

The achieven
however. In order
incentives, SEF de
for the cost of each
for inflation based
month on the aver
$19.10 per sq ft (
ceiling cost formu
conventional scho

Although ea
not, because they
general economy.
would have pushe
ceiling. On the co
depressed and pro
schools look muc
made a mistake by
first 1.25 million

be put together in a variety

hods)

t only construction, but
, including planning and
g drawings.
t, the programming, design,
successive step cannot

ast-tracking attempts to
hat they can overlap and
y periods, saved time is saved
acking to simultaneously
ion of the work, subsystem
gs on a third. As soon as
ut, subsystems may be bid.
r portions of the work rather

o anticipate what will be
eful control must be kept of
ation and decision-making;
ery portion of every task must
ugh the final day. Decisions

racking a school occurred in
tary schools took only 188 days
tects, Heery & Heery, believe
hould take not more than 15

of Educational Facilities (SEF)
or schools at all grade levels.
rmance specifications for
ol Board was then ready to solicit
skills, technology, and capital
ction. Bids were taken on
ecifications. In 1969, SEF bid

subsystems representing about 80% of total construction cost. A detailed analysis was made of the cost structure, performance, and interfacing of each subsystem, and selection was made of those offering the best overall value with a balanced emphasis on quality and cost.

Toronto's major goal was to upgrade the general quality of education and to provide new school facilities of improved quality and greater responsiveness to user needs. In terms of the physical facilities, SEF's objectives were manifold: to increase building flexibility, to increase value, to shorten construction time, to reduce initial costs, and to reduce operating costs.

Toronto feels it has received a great deal more value for its money. The school board estimates that it would cost about 30% more to build traditional schools with the facilities, services, and amenities equal to those it will get in SEF schools.

The first SEF school, the Roden Elementary School, was built in seven months instead of 14-18 months for conventional construction. The average construction time for the most recent 10 schools has been 8½ months. The scheduling has been improving with time, and this year Toronto gained two months over the previous year's projects.

The achievement of reduced initial costs was not that simple, however. In order to remove the risk to the bidder and to increase incentives, SEF decided to have manufacturers bid a firm base price for the cost of each subsystem alone. SEF would then add an allowance for inflation based on the Metro School Board Index (½% per month on the average). SEF established a base price target figure of $19.10 per sq ft (Canadian dollars) for K-6 schools. The Metro ceiling cost formula for K-6 school construction (based on conventional school costs) was $20.70 per sq ft.

Although early bids showed a promise of savings, final costs did not, because they were tied to this inflation factor and not to the general economy. Inflation did not continue as anticipated, which would have pushed conventional school costs above the $20.70 ceiling. On the contrary, in 1971 the construction market was depressed and profit margins were very low, making conventional schools look much better in comparison. As it turned out, Toronto made a mistake by committing itself to an escalation factor on the first 1.25 million sq ft. However, SEF put out another 250,000 sq ft

George Syme School, Toronto, built under the SEF program with integrated components.

for completion in 1972 with a fixed escalation factor.

The first 11 SEF schools were constructed as a group in 1970. Of the 10 which underwent construction in 1971, one is completed and occupied, three are completed, and six are still under construction. The Roden School, for which SEF was its own architect, came in at $18.71 per sq ft, 2% below the $19.10 target; the inflation factor brought costs up to $20.31, still under the $20.70 ceiling. The remainder of the first group except one came in above $19.10, while the second group has been held at or under $19.10 ($21-22.00 with inflation). The second group was able to meet the target because of experience gained with the first group. Architects knew what to look for and could make more efficient choices. General cost control at the local level was improved. Also, catalogues, which had been sketchy for the first project, were in finished form for the second.

Thus, despite snags, SEF has been able to demonstrate that savings from systems are possible; it has ironed out its inflation problem, and has been bringing the base cost down. Toronto has been able to cut construction time dramatically and has achieved a much better quality of space for the money.

The State of Florida has been developing its Schoolhouse Systems Project (SSP) since 1966. It is a bulk-purchase type of system using performance specifications for available components and subsystems. Its objectives are to provide higher quality schools at reduced costs, to introduce the systems building concept to Florida, and to attempt to build a large, state-wide market.

The SSP has produced progressively impressive savings. Over the past two years, while conventional construction costs have been rising rapidly, SSP has achieved an 18% reduction in bid prices for three basic building subsystems.

A recent group of eight high schools was constructed with a 40% reduction in construction time. Another group of 14 elementary schools came in with a 12% reduction.

How the size of a school system's market affects—or can affect—costs is also demonstrated by the Florida project. SSP estimates that if a systems building program is as low as 100,000 sq ft or about $2 million, the cost of systems building is about the same as conventional techniques. If the program rises to 500,000 sq ft, or about $10

million, the cost of
conventional costs.

In addition, th
subsystems, Florida
building that is in sy

Broward Coun
building program d
million, in as little ti
schools between 12
the architects. Cons
technique that enab
assemblies while th
Thus, when the gen
foundations for a sch
were ready to be inst

The Hillsboro
Oregon, was designe
systems components
on ceiling and lighti
193,000 sq ft of high
construction. The sc

Merrick, a sma
built additions to thr
record time. By usin
systems, the architec
build the three addi
occupied about 10 m
been used. Assumin
saving of at least 5-1

Four subsysten
airconditioning, roof
contract was let. Nor
electrical, plumbing
was budgeted at $31

The Merrick pr
scheduling and build
projects can be succe

ation factor.
ructed as a group in 1970.
n in 1971, one is completed
ix are still under construction.
s own architect, came in at
target; the inflation factor
ne $20.70 ceiling. The
came in above $19.10, while
er $19.10 ($21-22.00 with
meet the target because of
rchitects knew what to look
s. General cost control at
ogues, which had been sketchy
n for the second.
able to demonstrate that
ironed out its inflation
cost down. Toronto has been
y and has achieved a much

loping its Schoolhouse Systems
urchase type of system using
components and subsystems.
ity schools at reduced costs,
pt to Florida, and to attempt to

ly impressive savings. Over
construction costs have been
reduction in bid prices for

ls was constructed with a
nother group of 14 elementary

market affects—or can affect—
a project. SSP estimates that
as 100,000 sq ft or about $2
about the same as conventional
,000 sq ft, or about $10

million, the cost of subsystems drops to around 20% below conventional costs.

In addition, through experimentation with the inclusion of more subsystems, Florida has found that the higher the percentage of a building that is in systems construction, the lower the cost per sq ft.

Broward County, Florida, embarked in 1970 on a systems building program designed to deliver eight schools, costing $20 million, in as little time as possible. Students moved into most of the schools between 12 and 15 months after the county commissioned the architects. Construction time was reduced through a management technique that enabled manufacturers to bid on prefabricated assemblies while the architect was still developing final designs. Thus, when the general contractor completed site work and foundations for a school, the systems components for the building were ready to be installed.

The Hillsboro High School for 1,600 students near Portland, Oregon, was designed and constructed in only eight months, using systems components. Architects DeKanter & Holgate received pre-bids on ceiling and lighting, and structural roof components that for 193,000 sq ft of high school space were $5 per sq ft lower than normal construction. The school was bid at $18 per sq ft.

Merrick, a small school district on Long Island, N.Y., recently built additions to three elementary schools (about 25,600 sq ft) in record time. By using fast-tracking and bulk-purchase building systems, the architect (Caudill Rowlett Scott) was able to design and build the three additions within 18 months. The schools were occupied about 10 months earlier than if conventional methods had been used. Assuming cost escalation of ½-1½% per month, this is a saving of at least 5-15%.

Four subsystems contracts (structure, lighting-ceiling, airconditioning, roofing) were pre-bid six weeks after the design contract was let. Non-systems contracts (general construction, electrical, plumbing) were bid eight weeks later. The building cost was budgeted at $31 per sq ft and bids came in at $27.30 per sq ft.

The Merrick project has shown that the combination of fast-track scheduling and building systems techniques developed for large-scale projects can be successfully applied to a small project as well.

Floating Schools

In places where land is expensive or difficult to find or where school space is needed immediately, floating schools may provide a solution to the school building problem. A recent study for EFL suggests that barges or floating platforms built as schools can be more economical and constructed in much less time than conventional land-based schools. A prototype design based on conditions in Boston was estimated to cost 15% less to acquire and take 43% less time to construct than the most recent conventional schools, land costs included.

The prototype design would house learning space for 500 students on three decks, each of 19,500 sq ft gross floor area. The top deck would be walled outdoor play area. Space below the lowest deck is allocated to machinery, tankage, and storage. The overall dimensions of the barge structure are 265 ft by 78 ft by 43 ft deep.

The design meets the requirements of the American Bureau of Shipping, the National Electrical Code, and the safety code of the U.S. Coast Guard. Its cost is based on actual shipbuilding cost experience in the Boston area, assuming no mass production economies. Included in the cost are labor, materials, overhead, wastage, and profit.

Total development cost for a single prototype Floating Classroom Complex was found to be about $42.70 per sq ft. This can be compared with from $47.20 to $54.70 per sq ft for land acquisition, site development, design, and construction of the most recent land-based Boston schools. This averages about 15% direct saving on construction.

Although no established figure is available, it is assumed that maintenance costs would be higher for a Floating Classroom Complex because of the extensive need for painting. Docking fees would, however, probably not exceed the revenue lost to the city by maintaining land-based schools on tax-free land. Although the life expectancy of the Floating Classroom Complex is estimated at 30 years rather than the 40-50 years of a conventional school, this difference could be offset by the scrap value of the floating steel structure.

Floating schools should be able to cut construction time almost

in half, from 92 weeks for a convention
for the FCC. Of course, once producti
will begin to decrease even more rapi
production economies: using one set o
ordering materials in large lots, and ap

Costs can be substantially reduce
one floating school at a time. Thus, wh
one prototype unit would be $42.70, t
would be $38.60, and for 10 units, as l

There are no special problems ass
of the size of the FCC, so it can be bui
its final location. Due to competitive bi
somewhat lower on the Gulf Coast an
Atlantic Coast. A floating complex buil
to cost $1.40 per sq ft less than in Bost

Perhaps the greatest economy of
it reserves valuable city land for other
for a school could be used for commerc
taxes that would help pay for the floati

Large, Inexpensive Structures

Most school planners and architects ar
improving and modernizing traditiona
constructing a schoolhouse. A few are
of structures that will enclose large am
greatly reduced cost with domes and a

Many of these structures are not
began developing the geodesic dome i
technological problems are still being
problem of creating inexpensive cover
that prevent the build-up of solar heat
the problem of providing regulated te
spaces. All of these problems are bein
close to being solved.

Air-supported structures, comm
fabric skins held up by air pressure. T
and roof of the structure. Cables hold

in half, from 92 weeks for a conventional Boston school to 52 weeks for the FCC. Of course, once production begins on a large scale, costs will begin to decrease even more rapidly. This is due to mass production economies: using one set of templates for a large order, ordering materials in large lots, and applying assembly line methods.

Costs can be substantially reduced by procuring more than one floating school at a time. Thus, when the estimated sq-ft cost of one prototype unit would be $42.70, the estimate for three units would be $38.60, and for 10 units, as low as $33.

There are no special problems associated with towing a vessel of the size of the FCC, so it can be built in any shipyard and towed to its final location. Due to competitive bidding, shipbuilding costs are somewhat lower on the Gulf Coast and Great Lakes than on the Atlantic Coast. A floating complex built in the Great Lakes is estimated to cost $1.40 per sq ft less than in Boston.

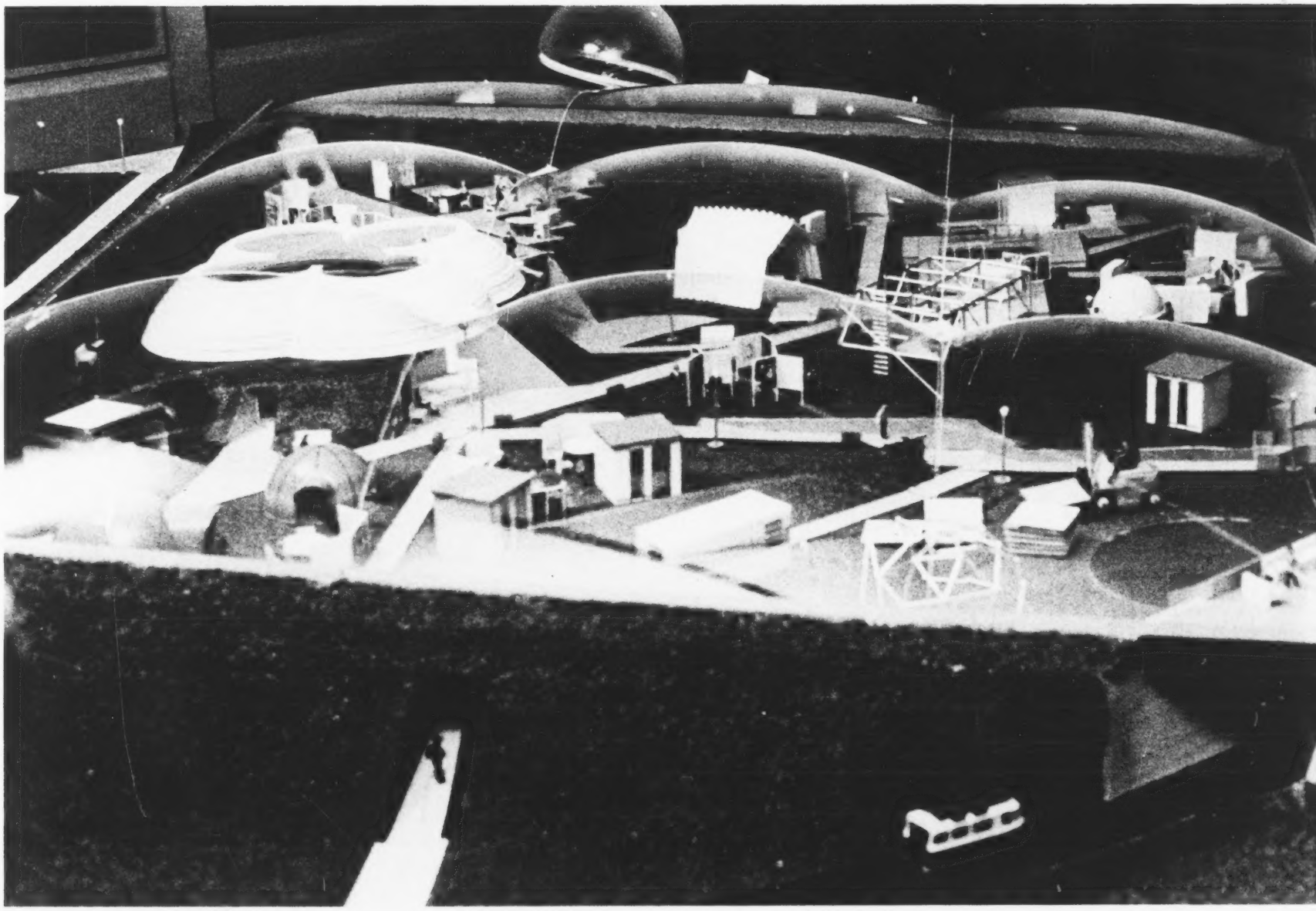
Perhaps the greatest economy of the floating school idea is that it reserves valuable city land for other than school uses. Land not used for a school could be used for commercial development generating taxes that would help pay for the floating school.

Large, Inexpensive Structures

Most school planners and architects are trying to lower costs by improving and modernizing traditional methods of designing and constructing a schoolhouse. A few are, however, developing new kinds of structures that will enclose large amounts of space quickly and at greatly reduced cost with domes and air-supported membranes.

Many of these structures are not new (R. Buckminster Fuller began developing the geodesic dome in the 1920's), but many of the technological problems are still being worked on. These include the problem of creating inexpensive coverings that last for 20 to 40 years, that prevent the build-up of solar heat, and are vandal-resistant; or the problem of providing regulated temperatures inside large open spaces. All of these problems are being worked on, and some are now close to being solved.

Air-supported structures, commonly known as "bubbles," are fabric skins held up by air pressure. The skin serves as both the walls and roof of the structure. Cables hold the structure down, and



Model of proposed Antioch College campus at Columbia, Md. Roof membrane spanning between earth berms will be held up by air blowers and restrained by cables above it.

blowers hold the structure up by maintaining air pressure. The newest structures can enclose more than 200,000 sq ft. Air-supported structures are inexpensive and can be easily and cheaply replaced. When the skin wears out, the whole structure can be sent back to the factory for reconditioning or covered by a new skin.

Inflated bubbles made their debut on school and college grounds almost a decade ago as coverings for physical education spaces. One of the pioneers was the Forman School in Litchfield, Connecticut, which, in 1961, erected two bubbles, one enclosing a swimming pool and the other enclosing tennis courts.

Bubbles have developed considerably since 1961. Antioch College is now planning to enclose one acre of land with a 44,000-sq-ft, 30-ft-high bubble for a satellite campus in Columbia, Maryland. The bubble will provide inexpensive space that can be easily moved to another location after several years. It will house classrooms, studios, information resources, living accommodations, a college green, and administrative space for 300 students.

The structure will consist of two clear vinyl membranes, reinforced by cable, and will use the air layer between as insulation. The outer skin will be reflective to reduce solar heat gain. Conventional heating equipment will be used, and a pipe grid inside the bubble will support lighting equipment.

Total construction time, including earthwork and mechanical, is estimated at one month; the structure itself will take only a few days to construct. Total cost (including site, HVAC, mechanical, plumbing, and major interior equipment) is estimated at a phenomenally low $4 per sq ft. The architect, Rurik Ekstrom, and the college have put up a prototype structure covering 1,000 sq ft, made of the same materials as the proposed campus structure.

In addition to bubbles, designers are also developing geodesic domes for educational spaces. A geodesic dome is based on the geometry of a sphere, and is essentially a frame in which the main structural elements are interconnected in a pattern of great circle arcs, intersecting to form a 3-way grid. The structure consists of three basic elements: the struts which form the frame, the skin which covers them, and the joints in between. Struts can be made of metal or wood; skins can be made of plywood, vinyl, fiberglass, or metal sheets. The resulting structure is e

East Windsor, New Jersey, R
geodesic dome in its public school
elementary school seats in a hurry
for a hopeful opening in Septemb
dome helped cut design and constr
New Jersey's average 2½ years to

The pentagon-shaped dome
anodized aluminum, diamond-sha
hexagonal struts. Foundations w
components were prefabricated a
completed one month from the da

The area of the dome is 16,0
the entire school is 23,000 sq ft, in
interior space consists of an open l
classrooms, a multipurpose room,
an art materials center with a large
and a health suite on the mezzanin

The total development cost
landscaping, was $520,000. This
space, and is at least a $5 per sq ft
New Jersey with the same facilitie

Economies of Open Space

Conventional schools use only abo
educational space. Schools built
in their use of total floor area.

Open plan space differs from
in that a minimum number of inte
corridors are eliminated, creating
several classrooms. The operating
creating more usable instructiona

The difference between tota
instructional space is the space oc
toilets and plumbing, mechanical
corridors and walls, open plan sc
of 80% or more.

sheets. The resulting structure is exceedingly strong and lightweight.

East Windsor, New Jersey, Regional School District uses a geodesic dome in its public school system. The district needed 300 elementary school seats in a hurry. Planning started in January, 1970, for a hopeful opening in September. The decision to use a geodesic dome helped cut design and construction time for the school from New Jersey's average 2½ years to less than 1 year.

The pentagon-shaped dome was assembled on-site out of anodized aluminum, diamond-shaped panels, and tubular aluminum hexagonal struts. Foundations were cast while the geodesic components were prefabricated at a factory. The structure was completed one month from the date the panels arrived at the site.

The area of the dome is 16,000 sq ft and its height is about 30 ft; the entire school is 23,000 sq ft, including the mezzanine. The interior space consists of an open learning area equivalent to 12 classrooms, a multipurpose room, a kitchen, a science materials center, an art materials center with a large library, administration space, and a health suite on the mezzanine.

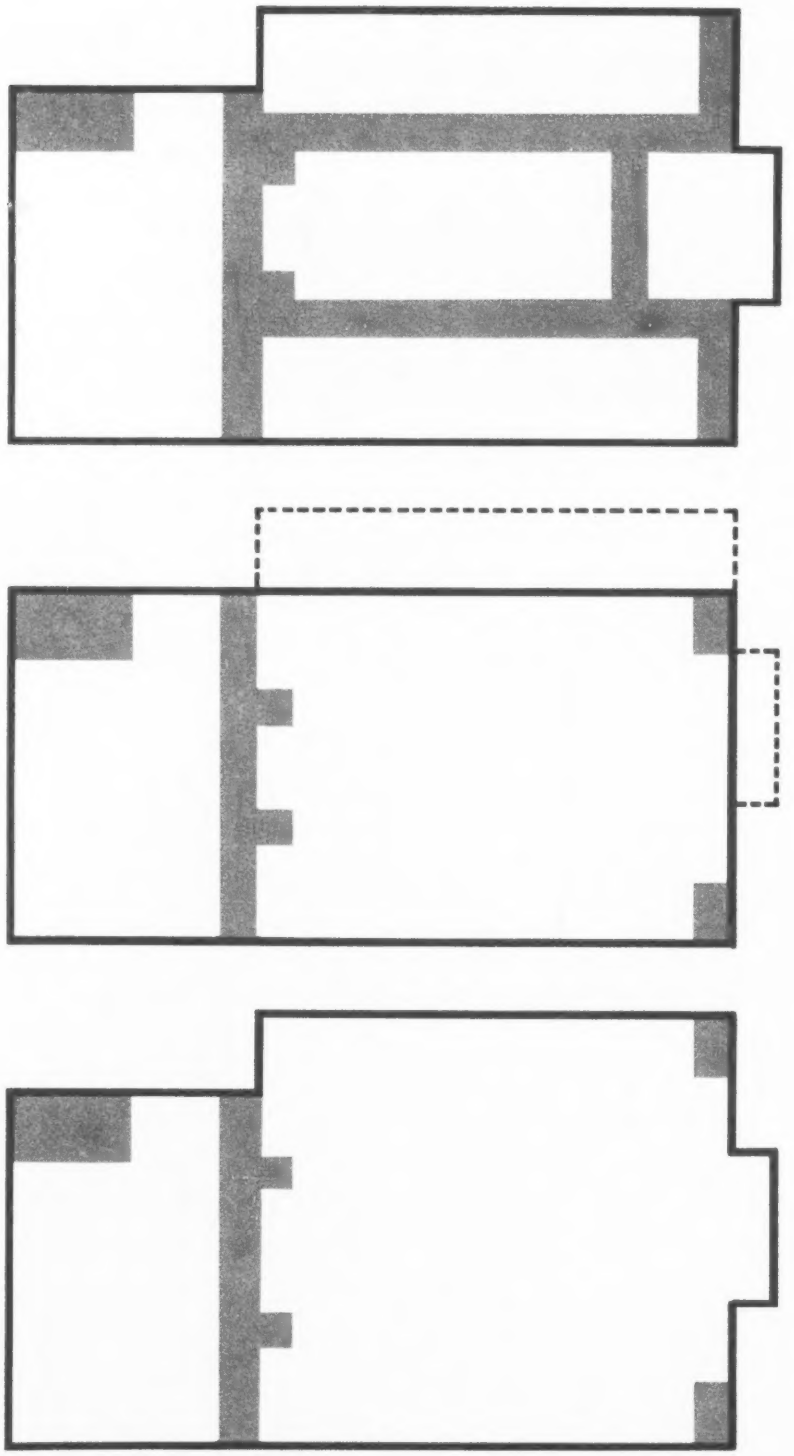
The total development cost, including all site work and landscaping, was $520,000. This is a cost of $22.60 per sq ft of floor space, and is at least a $5 per sq ft savings over conventional schools in New Jersey with the same facilities (about $27 to $29 per sq ft).

Economies of Open Space

Conventional schools use only about 66% of their gross floor area for educational space. Schools built on an open plan are more economical in their use of total floor area.

Open plan space differs from conventional enclosed classrooms in that a minimum number of interior partitions is used. Most corridors are eliminated, creating open learning areas equal in size to several classrooms. The operating capacity of the space is raised by creating more usable instructional space within the same total area.

The difference between total gross floor area and net usable instructional space is the space occupied by corridors, interior walls, toilets and plumbing, mechanical, and general storage space. Without corridors and walls, open plan schools have shown net to gross ratios of 80% or more.



Gross Sq Ft 31,525
Net Sq Ft 24,540
Net/Gross 70%

CONVENTIONA

Gross Sq Ft 27,025
Net Sq Ft 24,375
Net/Gross 90%

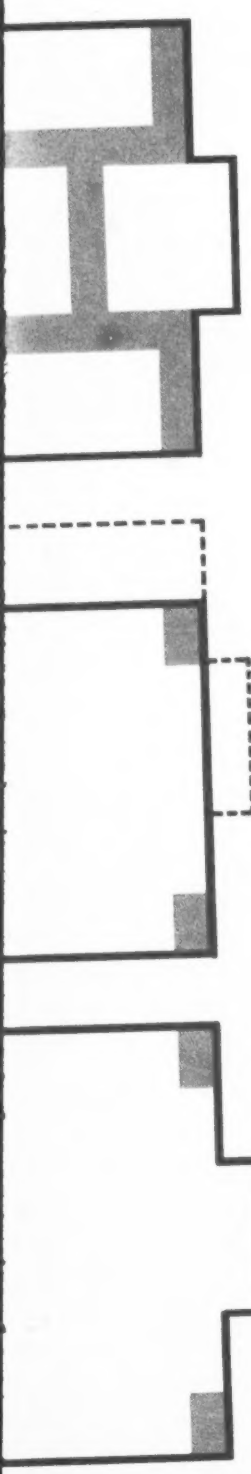
ALTERNATE #

Gross Sq Ft 31,525
Net Sq Ft 28,875
Net/Gross 91%

ALTERNATE #

Adapted from Warren Ashley's East Rochester Elementary Scho

How Open Plan Schools Achieve a Higher Net/Gross Ratio



Gross Sq Ft 31,525
Net Sq Ft 24,540
Net/Gross 70%

CONVENTIONAL SCHOOL

Gross Sq Ft 27,025
Net Sq Ft 24,375
Net/Gross 90%

ALTERNATE #1

Gross Sq Ft 31,525
Net Sq Ft 28,875
Net/Gross 91%

ALTERNATE #2

Key: Non-Educational space ■
Net Educational area □

Adapted from Warren Ashley's East Rochester Elementary School Plans.

Open plan schools can achieve economies by making space less elaborate, thus lowering the per pupil cost of construction as well as the cost per square foot. To a great extent, savings arise from the elimination of expensive partitions and doors. Heating, ventilating, and electrical work are less complicated, and less duct work is necessary. A simpler system also means lower labor costs and faster construction time.

In addition, teachers and administrators claim that open-plan space affords both greater flexibility and more efficient use by allowing a variety of group sizes to meet in one space, thus eliminating poorly-used or half-occupied classrooms.

An open-plan school requires quite a different approach to furnishings and equipment. Visual space dividers are necessary—usually in the form of shelf-storage and blackboard units. Furniture should be movable and preferably have multiple uses (such as a storage unit used as a space divider or a desk that converts to a chair).

Carpeting is the rule in an open-plan school, and other acoustical controls such as ceiling insulation are usually required. Both of these items have been included in the quotations of open-plan construction costs which follow, yet the total costs are still lower than those of conventional schools.

The Cherry Creek school system in metropolitan Denver can point to significant savings in the open-plan Walnut Hills School. This elementary school opened in September, 1969, with three open-plan instructional areas. A fourth instructional area was recently completed, giving the school a total of 36,800 sq ft gross, and a capacity of 600. The entire school is open-plan (excluding 3,000 sq ft of office space) and consists of four large learning modules around an open, book-lined educational mall. Almost 85% of the total space at Walnut Hills is instructional space, contrasted to about 65% in the average Cherry Creek elementary school.

The total construction cost for this facility was about $155,000 including carpeting, acoustical ceilings, and built-in cabinetwork, but excluding fees, site work, and movable equipment. The $19.25 cost per sq ft compares favorably with the estimated cost in 1970 of a conventional school of the same capacity—$22 per sq ft. Cost per student was about $1,200 (including furnishings), which is at least $500 less than the comparable figure for a

Although open planning is usually as schools, it is beginning to be used in second senior high school in East Aurora, New Y

This school, serving 1,200-students i floor area of 168,500 sq ft. It includes si large science center, specialized learning fa two large-group instruction rooms, and a extensively carpeted and is airconditioned

The total construction cost (includin HVAC, electrical and plumbing) was $2 $0.49 per sq ft. The total, $21.17, is at lea New York State average for high school period ($23.20), even with additional co

Warren Ashley, architect for the Ea achieved similar economies in Union Hi Vermont; Kearsage Regional High Scho and Lisbon Falls, Maine, Senior High Sch

$500 less than the comparable figure for a conventional school.

Although open planning is usually associated with elementary schools, it is beginning to be used in secondary schools, such as the new senior high school in East Aurora, New York.

This school, serving 1,200-students in grades 9-12, has a gross floor area of 168,500 sq ft. It includes six general learning areas, a large science center, specialized learning facilities, a swimming pool, two large-group instruction rooms, and an 800-seat auditorium. It is extensively carpeted and is airconditioned throughout.

The total construction cost (including general construction, HVAC, electrical and plumbing) was $20.68 per sq ft. Carpeting cost $0.49 per sq ft. The total, $21.17, is at least $2 per sq ft less than the New York State average for high school construction during the same period ($23.20), even with additional cost for carpeting.

Warren Ashley, architect for the East Aurora school, has achieved similar economies in Union High School, Rockingham, Vermont; Kearsage Regional High School, Sutton, New Hampshire; and Lisbon Falls, Maine, Senior High School.

5 SHARING THE COST OF NEW SCHOOLS

In addition to savings induced by new construction methods, many communities find ways to share the cost of building a new school. Land development, construction, and design work often become less expensive for one building housing two or more occupants than if each owner built individually. In this way, cities displace fewer family dwellings or they can preserve valuable land for commercial investment.

Joint Occupancy

Under conventional methods of building schools, the entire cost of a school and the interest on its bonds must be carried by local and state taxes. In addition, the land used for schools is in most cases removed permanently from the tax rolls, thus decreasing the local tax base. To avoid this burden, land and airspace can be occupied jointly by a school and income-producing private enterprise such as housing, retail stores, or office space. Usually joint occupancy results in a single structure or complex of mixed public and private uses, all jointly designed, constructed, and operated. The ideal arrangement is to include enough taxpaying commercial space to carry the cost of the debt service on the school. The school, in this sense, "pays for itself" from the expanded tax base.

The concept applies to private as well as public schools. It is clearly a major way of reducing the financial impact of new school construction. Joint occupancy does not necessarily reduce the actual cost of construction (although there appear to be economies if the total complex is built by the private developer under a single construction contract). But it can, under ideal circumstances, provide a way of creating new schools without raising the tax rate.

The most dramatic economies from joint occupancy result from the work of the New York City Educational Construction Fund, a state authority created in 1966 for planning and constructing joint-occupancy projects in New York City. The Fund is building $140 million of new schools for the city in combination with $300 million of housing and commercial space. Because of the tax income from the commercial space, the city will not have to invest capital funds in the construction of these schools.

The Fund is e
of the schools, to pl
and to pay back th
private space. Afte
from the commerci
and a permanent ad

New York Cit
problems that it is
buildings and publi

A desperate n
Friends Select Scho
inner-city land for
office building now
with a working end

The arrangem
to replace its antiqu
sq ft of space. In a
including a large a
rents from the offic
on the $3.2-million
jointly planned, bu
between them. The

Finding Partners

Partnership arrang
are not limited to c
of a school "going i
finding public-publi
government share s
and economical wa
one time. Public libr
colleges, job center
recreational facilitie

Shared space a
economical use of s
"finding partners,"
traditional building
its own separate fac

HOOLS

truction methods, many
of building a new school.
gn work often become less
more occupants than if
cities displace fewer
able land for commercial

schools, the entire cost of a
be carried by local and
r schools is in most cases
thus decreasing the local tax
pace can be occupied jointly
e enterprise such as housing,
t occupancy results in a
blic and private uses, all
ed. The ideal arrangement is
space to carry the cost of the
in this sense, "pays for

ell as public schools. It is
ncial impact of new school
ecessarily reduce the actual
ear to be economies if the
veloper under a single
r ideal circumstances, provide
aising the tax rate.
n joint occupancy result from
onal Construction Fund, a
nning and constructing
City. The Fund is building
in combination with $300
e. Because of the tax income
l not have to invest capital
ls.

The Fund is empowered to issue its own bonds to cover the cost of the schools, to plan the project and select the private developer, and to pay back the debt service on bonds out of the income from the private space. After the Fund's bonds have been paid off, the income from the commercial space will revert to the city as normal revenue and a permanent addition to the city tax base.

New York City considers joint occupancy so relevant to its problems that it is considering a law requiring all future commercial buildings and public housing to include school space.

A desperate need to modernize its facilities convinced the Friends Select School in Philadelphia to lease one of its three acres of inner-city land for commercial office space. The 20-story, 525,000-sq-ft office building now yields enough rental to provide Friends Select with a working endowment and economic security for the future.

The arrangement allowed Friends Select to build a new facility to replace its antiquated plant. The old building had about 65,000 sq ft of space. In a new facility, the school has about 120,000 sq ft, including a large auditorium, swimming pool, and gymnasium. The rents from the office space cover the $175,000-per-year debt service on the $3.2-million new school facilities. The two buildings were jointly planned, but there is no physical or programmatic relationship between them. The structures stand 18 ins. apart.

Finding Partners

Partnership arrangements to finance school-community complexes are not limited to cooperation with the private sector, nor to the idea of a school "going into business for itself." Many communities are finding public-public joint occupancy, in which branches of local government share space and expenses with a school, to be a workable and economical way to provide a package of community services at one time. Public libraries, day-care centers, health facilities, community colleges, job centers, welfare and social service agencies, cultural and recreational facilities all make natural partners for schools.

Shared space and facilities makes for more efficient and economical use of space. For this reason, public-public financing, or "finding partners," insures more value for the money spent than traditional building programs in which each city department builds its own separate facility.

Friends Select School, Philadelphia, built low-level school structure in foreground with funds derived from leasing land under high-rise office building in background.

The School and Recreation Departments of Arlington, Virginia, have pooled $6.5 million of earmarked bond money to build a combined new junior high school and municipal recreation center on a 26-acre prime site. The idea of cooperative construction emerged from a controversy over the land. Both groups claimed the 26-acre site, which would probably have had to be divided.

Preliminary planning revealed, however, that both groups needed more facilities than either could pay for alone. They therefore decided to plan and build a combined facility. The aim was to avoid unnecessary duplication and to demonstrate the results of good community planning.

The school planners wanted to provide art, industrial arts, a theater and auditorium, music rooms, cafeteria space, a gym, and outdoor recreation areas. The recreation people wanted to provide these same facilities after school and on weekends and during summer vacations. By putting the two facilities together and planning for shared use, they have been able to get more and better space for the combined $6.5 million than either group would have been able to obtain separately.

The Thomas Jefferson Junior High School and Community Center will be a regular junior high for 1,400 students. It will also provide programs for dropouts and for the elderly. Facilities will include games, art and project rooms, an auditorium and theater, a snack bar, music practice rooms, and large outdoor playing fields and tennis courts. The money saved by not duplicating facilities has been used to improve the specialized space. In addition, the community has been able to get more space than would have been possible if two separate facilities had been built.

The school and community will share a 68,000-sq-ft enclosed multi-use space, the Controlled Environment Facility, that could not have been built without cooperative planning and the pooling of funds. The CEF will be used for sports events, exhibits, and many other activities. In this area, architects estimate the community has gained 30,000 to 40,000 sq ft by joint planning. At $20 per sq ft this represents a "saving" between $600,000 and $800,000.

The project will also achieve indirect savings on such things as maintenance, shared storage areas and supplies, and building under a

single contract. HV
over larger areas. Al
space, and achievin
share the cost and us

The Human Re
new school with nei
an education park w
activities, recreation

The HRC is sit
black area. Its aim is
downtown section o
overcrowding, and h

Community sp
suite, lounge, and gy
space for 1,800 to 2
around specialized f

Money to build
$4.5-million school
$1.5 million under t
community facilities
and day-care center,
is complete.

It is evident th
economical, consid
Moreover, shared p
to duplicate facilitie
project director, is c
50% of the cost of t

As an investm
increasingly valuabl
the area, it should b
reverse the trend to

A successful fi
detailed joint plann
both will be met. U
everyone's satisfact

A new high sc

ments of Arlington, Virginia,
ond money to build a
unicipal recreation center on
tive construction emerged
groups claimed the 26-acre
be divided.
wever, that both groups
pay for alone. They therefore
cility. The aim was to avoid
rate the results of good

vide art, industrial arts, a
afeteria space, a gym, and
n people wanted to provide
weekends and during summer
together and planning for
nore and better space for the
ip would have been able to

gh School and Community
1,400 students. It will also
the elderly. Facilities will
n auditorium and theater, a
rge outdoor playing fields and
duplicating facilities has been
In addition, the community has
d have been possible if two

share a 68,000-sq-ft enclosed
onment Facility, that could not
lanning and the pooling of
s events, exhibits, and many
s estimate the community has
t planning. At $20 per sq ft this
,000 and $800,000.
direct savings on such things as
d supplies, and building under a

single contract. HVAC systems are cheaper to install and maintain over larger areas. All of these savings in better space, better use of space, and achieving more space are the result of finding partners to share the cost and use of an elaborate complex.

The Human Resources Center in Pontiac, Michigan, combined a new school with neighborhood renewal. The HRC was conceived as an education park with facilities for educational and cultural activities, recreation, commercial rehabilitation, and redevelopment.

The HRC is situated on the edge of Pontiac's predominantly black area. Its aim is to revitalize not only the black ghetto, but the downtown section of the city as well. Integration, elimination of overcrowding, and better community services are its basic goals.

Community space, including a public library, restaurant, medical suite, lounge, and gymnasium, is being built over elementary school space for 1,800 to 2,000 students. The classrooms will be placed around specialized facilities, such as music rooms and a mini-theater.

Money to build the HRC has been jointly provided by a $4.5-million school bond and the federal government. HUD granted $1.5 million under the Neighborhood Facilities Act to underwrite the community facilities. Nonprofit community groups, including a health and day-care center, will share space with the school when the project is complete.

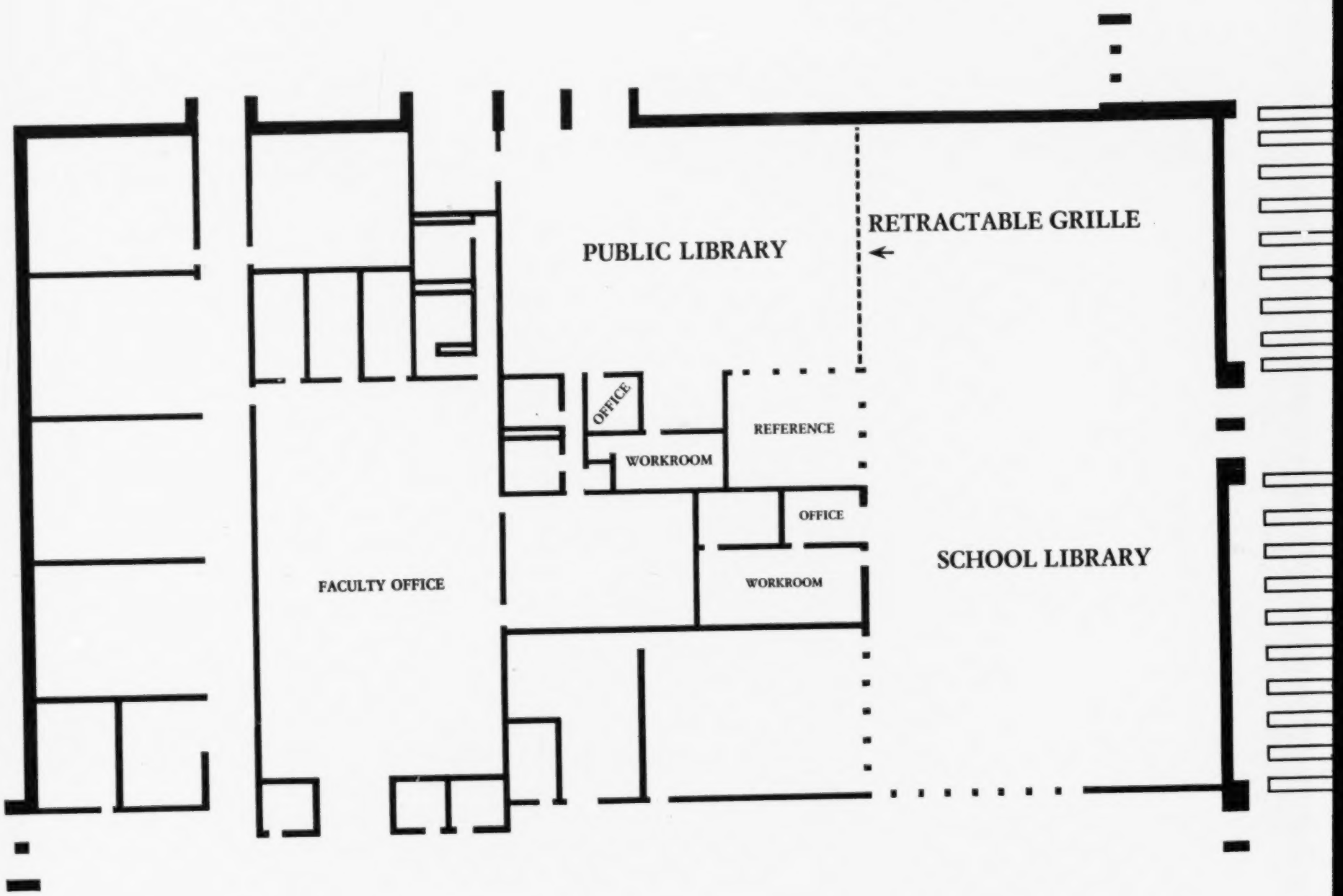
It is evident that in land and planning costs the HRC is . economical, considering the type and quality of space being provided. Moreover, shared planning and programming have removed the need to duplicate facilities. Bert Van Koughnett, the school system's project director, is convinced that the city has saved money ("at least 50% of the cost of the gym alone") by overall community planning.

As an investment for the future, the HRC is expected to reap increasingly valuable dividends. By revitalizing human resources in the area, it should be able to stimulate sufficient interest in the city to reverse the trend toward downtown deterioration.

A successful finding partners approach necessitates careful and detailed joint planning by both partners to ensure that the needs of both will be met. Unfortunately, not all partnerships work out to everyone's satisfaction.

A new high school in Hodges Manor, a suburb of Portsmouth,

Hodges Manor High School, Portsmouth, Va., shares some of its library facilities with a public library. A retractable grille enables one section to be temporarily separated from the other.



Virginia, will include a joint use school-public library, the only branch public library in the area. The two libraries will be contiguous, with only a grille that can be lowered to separate them. Students are expected to use the facilities during the day. High school students and the public will share them at night. The entire school is to be used as a community center for all age groups, and is to include a planetarium, field house, and theater.

The library facilities have been planned with an eye on the economies of joint use. The public library space will be only 3,300 sq ft as compared with about 6,000 sq ft for a normal branch library. Students and the community will share the same reference room and books. Furnishings, bookshelves, carpeting, etc., for both libraries will be jointly purchased.

The project's architects emphasize increased service to the community as a far more important factor than dollar savings; however, savings will probably amount to $60,000 on the library. Joint use will provide a library that the community could not have afforded otherwise.

6 PUTTING ALTERNATIV

A few communities, both old
multiple economies by puttin
conventional school building
systems construction, for ins
occupancy and the findings o
of factories, warehouses and
open campus, home base sch

Most of these combinat
relationship between school
mingling of school and comm
community planning to ensu
is made more economical. It
programs where local commu
from total clearance and rebu
rehabilitation. Any project th
quantities of new housing an
libraries, and schools) is a ri

The South Arsenal Nei
(SAND) is a community gro
Puerto Rican section of dow
1967, SAND has been negot
the school system, and state
novel community developme

South Arsenal was orig
residents decided they did n
rebuilt as a high-income hou
residents wanted to remain
community with better hous

After a considerable am
negotiation with the various
radical idea—its elementary
small units throughout the g
school would be "everywhe
in the immediate neighborh

ool-public library, the only
e two libraries will be contiguous,
d to separate them. Students are
the day. High school students and
The entire school is to be used
oups, and is to include a
er.
n planned with an eye on the
ibrary space will be only 3,300
) sq ft for a normal branch library.
hare the same reference room and
arpeting, etc., for both libraries

asize increased service to the
t factor than dollar savings;
ount to $60,000 on the library.
t the community could not have

6 PUTTING ALTERNATIVES TOGETHER

A few communities, both old and new, are working to achieve multiple economies by putting together several alternatives to conventional school building. The concepts of open planning and systems construction, for instance, are being combined with joint occupancy and the findings of other public partners, or with the use of factories, warehouses and rented office space, or with the ideas of open campus, home base schools, and non school schools.

Most of these combinations of alternatives clearly involve a new relationship between schools and their surrounding community. This mingling of school and community demands comprehensive community planning to ensure that costs are reduced and school space is made more economical. It will best be achieved in urban renewal programs where local communities may be engaged in everything from total clearance and rebuilding to spot clearance and rehabilitation. Any project that involves building substantial quantities of new housing and related facilities (stores, social services, libraries, and schools) is a ripe candidate for these ideas.

The South Arsenal Neighborhood Development Corporation (SAND) is a community group operating in a low-income, black and Puerto Rican section of downtown Hartford, Connecticut. Since 1967, SAND has been negotiating with local anti-poverty agencies, the school system, and state and local civic groups to inaugurate a novel community development and educational plan.

South Arsenal was originally scheduled to be demolished, but its residents decided they did not want their area to be leveled and rebuilt as a high-income housing or commercial development. The residents wanted to remain where they were and rebuild their own community with better housing and better schools.

After a considerable amount of community planning and negotiation with the various agencies involved, SAND developed a radical idea—its elementary school space was to be dispersed in small units throughout the ground floors of the new housing. The school would be "everywhere." Children would be studying out in the immediate neighborhood, in the city, or even in the suburbs.

Basically, this idea has survived and has been approved by the relevant authorities, with one major reservation. Because the Federal Housing Authority has a 15% limitation on community space in its housing (and because school space did not fit its definition of community space), the school space will not be located on the ground floors of the housing. The school will still be dispersed throughout the community; however, most of the school space will occupy its own land, closely integrated with the housing.

Even with this exception, SAND's school space will be testing the notion of putting several alternatives together in order to gain multiple economies.

The basic Everywhere School unit is a multi-instructional area (MIA), a 5,250-sq-ft carpeted, climate-controlled, open space divided by casework and screens. Each MIA is planned to enroll 150 pupils, with 100 in the MIA and the other 50 in what SAND calls "environmental extensions" in other parts of the city and the suburbs. Two environmental extensions are already in operation as part of the school's experimental MIA. Twenty-five children each day now go to school on a rotating basis at a private school in the suburbs. Another 25 spend a day at an art museum in Hartford. The annual cost of busing children to these two locations is $4,000. SAND is exploring the development of other environmental extensions in such places as a nearby private college located in a suburb.

In addition to the children who leave South Arsenal each day, children from each MIA will be using the common facilities of the dispersed school—the gymnasium and swimming pool, the arts center, the theater, and the information resource center or library.

Each piece of the school will form a central part of a "neighborhood commons," the basic unit for the community as a whole. The commons will include housing for 20 to 50 families plus school and community services. There is also an area for retail stores.

The planners of SAND will be using the bulk-purchase, off-the-shelf, approach to systems building both in the housing and the school space. Largely by these methods and by open planning, they are predicting that their school space will come in at no more than $25 per sq ft vs. a $35 per sq ft average for conventional schools.

The multiple economies of SAND
the cost-per-pupil figures. In 1968, the
Education set aside a $4-million bond i
elementary school in South Arsenal. Ab
for land, architectural fees, etc., leaving
construction of school space. The estim
conventional school was thus $3,000 p

The SAND project, however, has
develop. The Hartford Board now esti
inflation have now made it possible to b
only 750 students under the $3-million
raise the per student cost to $4,000.

Jack Dollard, one of the original p
of its architects, disagrees. He believes
will be able to accommodate its full en
not more than $2.8 million. This woul
down to $2,300, thus saving $1,700 p
of the Board's estimate.

This will be possible in part due t
building and open planning, but to a m
will come from the way the school is to
from the fact that it is a home base sch

Because SAND is proposing that
students (400 children) will not be us
less space needs to be provided than fo
of only 800 children will be using the s
will provide a total of 90 sq ft per pupi
facilities, for its 800-students.

By conventional standards, a tota
average for a traditional elementary sc
total allotment of 120,000 sq ft for 1,
to provide only 72,500 total sq ft, or 4
up Dollard's estimate of a 40% reduc

Currently, SAND is using "foun
MIA in a local warehouse. The 5,000
available to SAND by the University o
about $20,000 fixing up the space ($4

The multiple economies of SAND, however, can best be seen in the cost-per-pupil figures. In 1968, the Hartford Board of Education set aside a $4-million bond issue to build a 1,000-pupil elementary school in South Arsenal. About $1 million of this was for land, architectural fees, etc., leaving $3 million for the actual construction of school space. The estimated per pupil cost of this conventional school was thus $3,000 per student.

The SAND project, however, has taken four years to plan and develop. The Hartford Board now estimates that those four years of inflation have now made it possible to build conventional space for only 750 students under the $3-million bond issue. This would raise the per student cost to $4,000.

Jack Dollard, one of the original planners of SAND and now one of its architects, disagrees. He believes that the Everywhere School will be able to accommodate its full enrollment of 1,200 students for not more than $2.8 million. This would bring the cost per pupil down to $2,300, thus saving $1,700 per student, or more than 40% of the Board's estimate.

This will be possible in part due to the savings from systems building and open planning, but to a much larger degree these savings will come from the way the school is to be operated, in particular from the fact that it is a home base school.

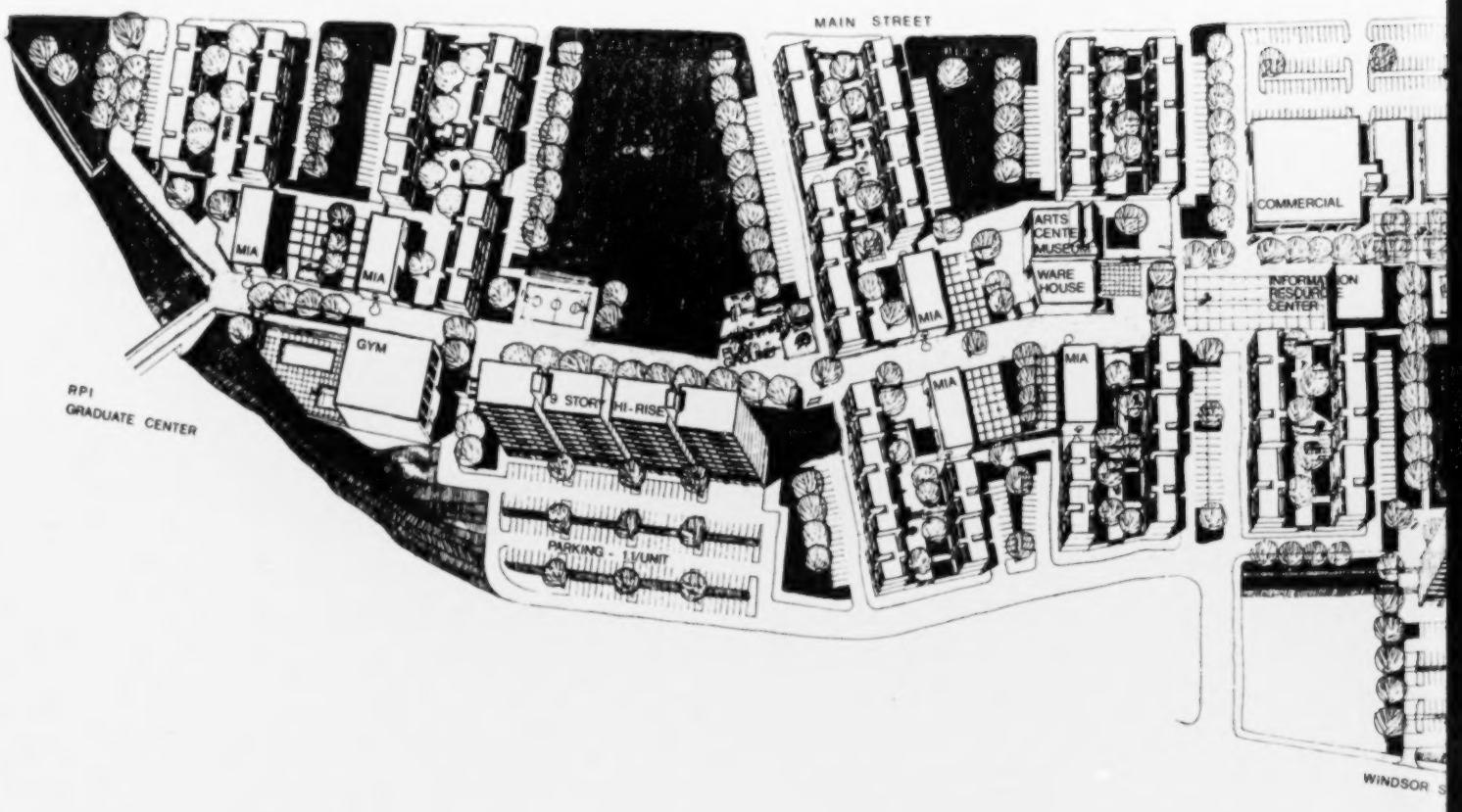
Because SAND is proposing that at any one time one-third of the students (400 children) will not be using the home base facilities, less space needs to be provided than for a conventional school. A total of only 800 children will be using the school space each day. SAND will provide a total of 90 sq ft per pupil, including the common facilities, for its 800-students.

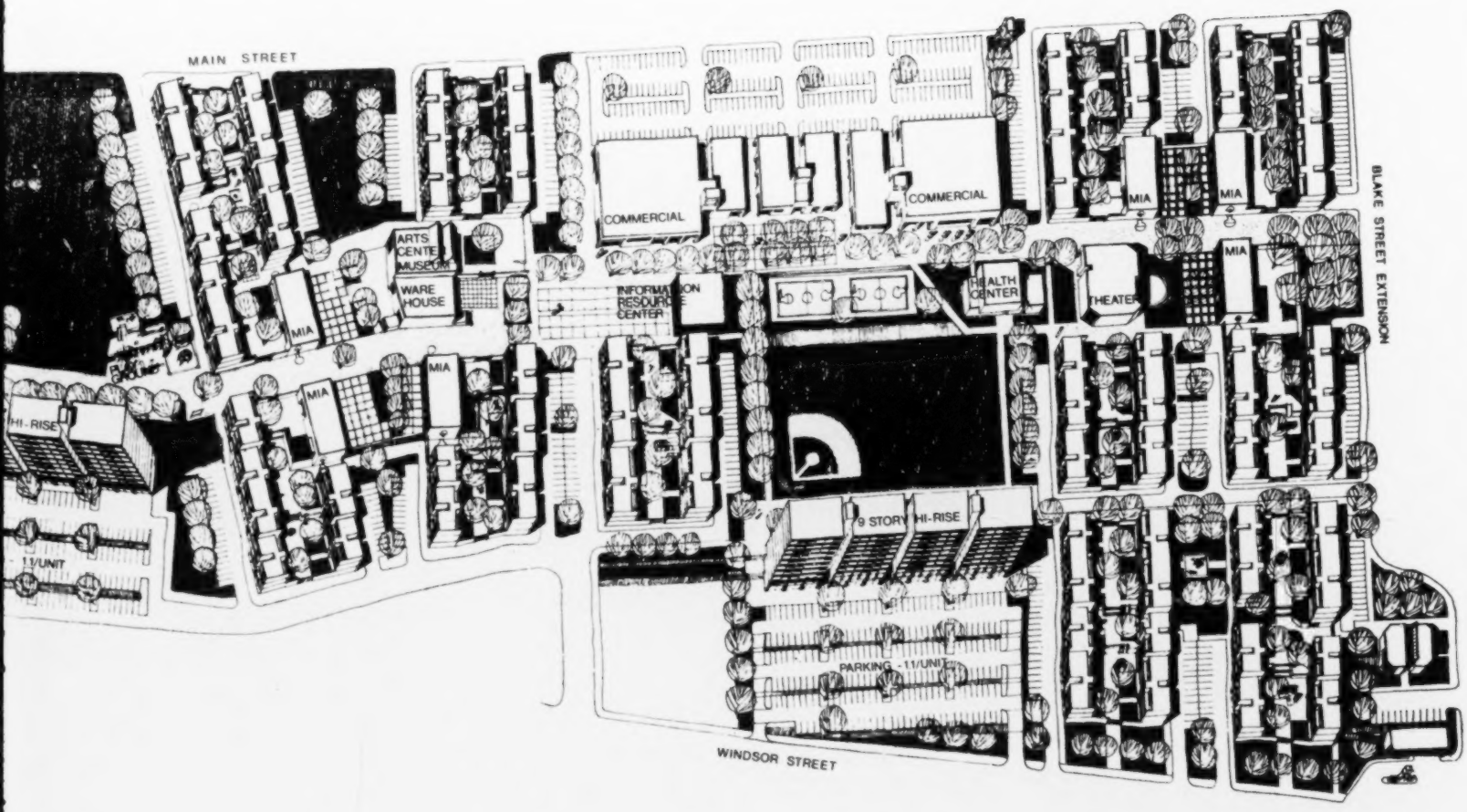
By conventional standards, a total of 100 sq ft per pupil is about average for a traditional elementary school. This would mean a total allotment of 120,000 sq ft for 1,200 children. SAND is proposing to provide only 72,500 total sq ft, or 40% less space, thus backing up Dollard's estimate of a 40% reduction in cost.

Currently, SAND is using "found" space for an experimental MIA in a local warehouse. The 5,000-sq-ft warehouse was made available to SAND by the University of Connecticut. SAND spent about $20,000 fixing up the space ($4 per sq ft), including

South Arsenal Neighborhood Development Proposal

36




MAIN STREET
COMMERCIAL
COMMERCIAL
MIA
MIA
MIA
ARTS CENTER MUSEUM
WARE HOUSE
INFORMATION RESOURCE CENTER
HEALTH CENTER
THEATER
BLAKE STREET EXTENSION
MIA
MIA
MIA
HI-RISE
1 1/UNIT
9 STORY HI-RISE
PARKING - 1 1/UNIT
WINDSOR STREET

fireproofing, carpeting, new lighting, etc., but this low cost was possible because a great deal of the labor and materials were donated by neighborhood people and interested outsiders. SAND hopes to acquire the warehouse as part of the urban renewal package and remodel it into the school's arts center.

Even though the Everywhere School will not be an ideal joint occupancy in mixing housing with schools, it has several other possibilities for joint occupancy.

One possible plan is to have a central kitchen for the school jointly occupying space with housing devoted to the elderly (this would fit under the FHA's definition of community space). The kitchen would supply food services to the MIA's and also provide cafeteria services for the elderly in its building.

Officials of the Hartford Public Library are considering whether it is possible to build a branch in the South Arsenal development. The result might be a partnership structure with the school's information resource center, thus creating a facility useful to the entire SAND community. It could also be more economical than two separate buildings.

In addition, SAND plans that all of the Everywhere School's facilities—the gym, theater, information resources center, etc.—will be available to the adult community in the evenings and on weekends. The MIA's will be used for adult education (especially bilingual education). The planners of SAND believe that this will eliminate the need for a community center costing a minimum of $1 million.

SAND and its Everywhere School is thus attempting to gain multiple economies by combining building systems, open space, finding partners, the home base school, found space, and possibly a small amount of joint occupancy. If the SAND plan materializes as its planners expect it to, the Everywhere School will represent a major change in the way we think about schools and schoolhouses. In addition, SAND will also represent a remarkable breakthrough in schoolhouse economy.

If multiple economies can be achieved in a small-scale project such as SAND, the opportunities for economy should be larger and more numerous in planning new towns and new cities.

There appear to be two basic kinds of new
United States: large towns or small cities built
Columbia, Md.), and new sections of older citi
the level of style and quality of urban life (such

Whatever their location or exact purpose
planned to be relatively complete and self-suffi
of housing, shops, restaurants, recreation spac
activities, and social services. If they happen to
political entities (which is rare), they will also
municipal services, including fire, police, and s
communities can provide employment for som
indeed, do attempt to attract industry and buil
economic base. But most new communities are
in-town communities for residents who work

It is this emphasis on establishing a distin
of its own that distinguishes a new community
urban renewal or the typical large housing dev
schools are a part of any distinct, integrated co
towns and cities provide opportunities to ex
such as systems building and automated trash
also ideally suited to educational experimenta
of multiple economies in designing and operat

Welfare Island sits in New York's East R
boroughs of Manhattan and Queens. It is a lon
150 acres. Except for two hospitals and a few
buildings, the island has never been developed

The city has leased Welfare Island to the
Development Corporation, a powerful state a
spur housing and other redevelopment projec
communities. A subsidiary of UDC, the Welfa
Corporation, will construct a $250-million co
5,000 units of high, middle, moderate, and lo
18,000 people. Shops, office space, parks, hea
cultural and educational facilities, a large gara
driven on the island), a transportation system
included in the overall plan. The WIDC plans
development to be completed in 1973, and th

There appear to be two basic kinds of new communities in the United States: large towns or small cities built in the country (such as Columbia, Md.), and new sections of older cities, attempting to raise the level of style and quality of urban life (such as Welfare Island).

Whatever their location or exact purpose, these communities are planned to be relatively complete and self-sufficient, at least in terms of housing, shops, restaurants, recreation space and facilities, cultural activities, and social services. If they happen to be independent political entities (which is rare), they will also have their own municipal services, including fire, police, and school systems. New communities can provide employment for some of their residents and, indeed, do attempt to attract industry and build a solid, self-sufficient economic base. But most new communities are commuter towns or in-town communities for residents who work elsewhere.

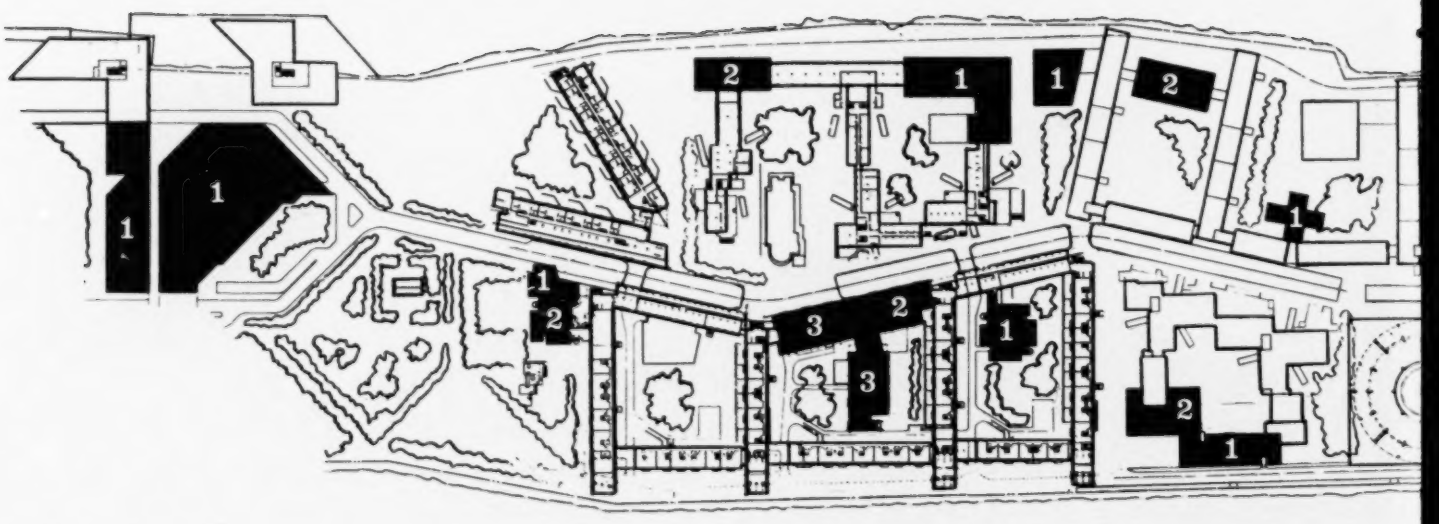
It is this emphasis on establishing a distinct, integrated life of its own that distinguishes a new community from conventional urban renewal or the typical large housing development. And clearly, schools are a part of any distinct, integrated community. Just as new towns and cities provide opportunities to exploit new technologies such as systems building and automated trash disposal, they are also ideally suited to educational experimentation and the achievement of multiple economies in designing and operating schools.

Welfare Island sits in New York's East River, between the boroughs of Manhattan and Queens. It is a long and narrow island of 150 acres. Except for two hospitals and a few small municipal buildings, the island has never been developed.

The city has leased Welfare Island to the New York State Urban Development Corporation, a powerful state authority created to spur housing and other redevelopment projects such as new communities. A subsidiary of UDC, the Welfare Island Development Corporation, will construct a $250-million community containing 5,000 units of high, middle, moderate, and low-income housing for 18,000 people. Shops, office space, parks, health and social services, cultural and educational facilities, a large garage (cars will not be driven on the island), a transportation system, and schools will be included in the overall plan. The WIDC plans for the first 60% of the development to be completed in 1973, and the total project in 1976.

Welfare Island Dispersed School and Day Care System

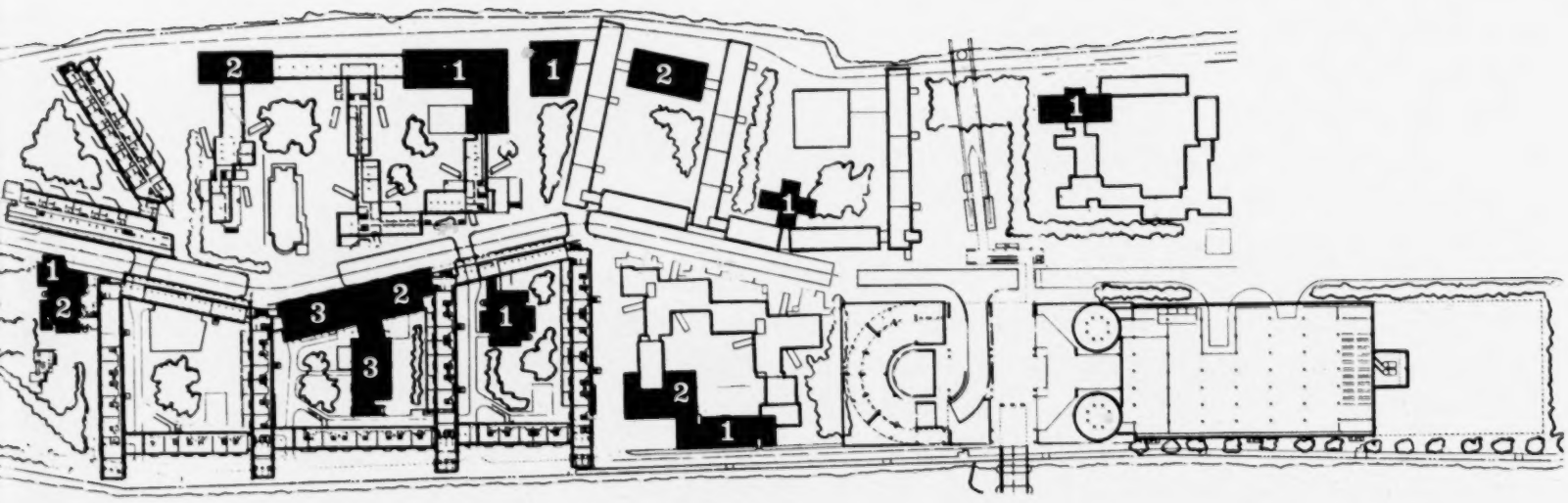
38



PHASE I

1 Schools
2 Day Care
3 Health Center

Day Care System



The proposed educational system for Welfare Island is being jointly planned by UDC, WIDC and the New York City school system to be a community education system extending from day-care through high school and continuing education for adults.

If built as proposed, there will be no separate buildings identifiable as school facilities. All school space will be distributed throughout the entire island. All home base space will be located in the housing. Older elementary children, middle school students, and high school students will use the island and the city as their school, spending large portions of their time in specialized centers mixed in with the island's non-housing facilities—such as the town center, stores, office spaces, theaters and the hospitals.

Present plans call for seven centers—visual and performing arts; biology, chemistry and health; environment and planning; economics and work; physical science and technology; communications (including a computerized island-wide information and library service); sports and recreation. Ecological studies will be conducted in an ecological park. Since the island will be linked to Manhattan and Queens by a new rapid transit line, the cultural and educational facilities of the entire city are available. Planners hope that the school system will be available for 18 hours a day all year round.

Conservative estimates project a school enrollment of 3,000 K-12 students. This will require about 300,000 sq ft to conform with New York City's Board of Education standards. Since new conventional school space in the city now costs $55 per sq ft, Welfare Island's 300,000 sq ft could be expected to cost the city $16.5 million for an average of $5,500 per student.

Following the multiple economy procedures exemplified in the SAND example, Welfare Island will attempt to drastically reduce the expected $5,500 per pupil cost:

—By lowering the per sq ft construction figure; and

—By organizing the educational process and using the school space in ways that either increase the number of students served or lower the total area needed.

Construction costs will be reduced:

—By incorporating flexible, open-plan space, thus getting more net usable space.

—By building the school space as part of th package of housing, commercial, and public large contracts without public bidding on t construct the school space as one small part construction job should allow economies in construction cost.

Planners expect to reduce the overall school space more productive and reduce th

—By joint use. All school spaces will be use community, thus making it unnecessary to community and cultural facilities.

—By joint funding or finding partners. Fac sports and recreation areas, the ecological p be jointly funded and thus will be larger an such spaces could be if built separately.

—By using the school space as home base s activities will be conducted in such non sch health facilities and town center, and, via r the city.

—By adopting the open campus and exten implement this concept so that as a student responsibility increases, his school progran either geographically or temporarily. Olde use the school spaces any time from early

—By the adoption of year-round schooling plan. If introduced to Welfare Island, this able to increase the operating capacity of th system by one-third, or about 1,000 studer

Welfare Island is still in its prelimina therefore, not yet known how many of the actually be realized. It would seem reasona additional students might be accommodate of making the space more productive, thus cost per pupil to around $4,000.

If the multiple economies of Welfare planned, this kind of radical thinking may economical kind there is.

are Island is being
ork City school
ending from day-care
or adults.
ate buildings
will be distributed
ce will be located in
school students, and
city as their school,
zed centers mixed
n as the town center,

al and performing
nt and planning;
ology; communications
tion and library
lies will be conducted
nked to Manhattan and
and educational
rs hope that the school
ear round.
nrollment of 3,000
0 sq ft to conform with
s. Since new
$55 per sq ft, Welfare
t the city $16.5

ures exemplified in the
o drastically reduce the

e; and
using the school space
dents served or lower

thus getting more net

—By building the school space as part of the total development package of housing, commercial, and public space. The ability to let large contracts without public bidding on the school portion and to construct the school space as one small part of a much bigger construction job should allow economies in both time and actual construction cost.

Planners expect to reduce the overall cost and/or to make the school space more productive and reduce the cost per pupil:

—By joint use. All school spaces will be used by students and the community, thus making it unnecessary to build additional community and cultural facilities.

—By joint funding or finding partners. Facilities such as theaters, sports and recreation areas, the ecological park, and food services will be jointly funded and thus will be larger and better equipped than such spaces could be if built separately.

—By using the school space as home base space. Educational activities will be conducted in such non school space as the island's health facilities and town center, and, via rapid transit, in the rest of the city.

—By adopting the open campus and extended day. Planners hope to implement this concept so that as a student's mobility and responsibility increases, his school program will not be confined either geographically or temporarily. Older students would be able to use the school spaces any time from early morning to late evening.

—By the adoption of year-round schooling, possibly on the 45-15 plan. If introduced to Welfare Island, this measure alone would be able to increase the operating capacity of the community education system by one-third, or about 1,000 students.

Welfare Island is still in its preliminary design stage. It is, therefore, not yet known how many of these potential economies will actually be realized. It would seem reasonable to guess that 1,000 additional students might be accommodated through the various ways of making the space more productive, thus possibly reducing the cost per pupil to around $4,000.

If the multiple economies of Welfare Island work out as planned, this kind of radical thinking may turn out to be the most economical kind there is.

INFORMATION SOURCES

Finding Space in School Buildings

Eastridge Elementary School

Edward C. Pino, Superintendent, Cherry Creek Schools,
4700 South Yosemite, Englewood, Colorado 80110.

William C. Haldeman, District Architect,
Cherry Creek Schools, Englewood, Colorado 80110.

El Cajon

Dr. M. Ted Dixon, Superintendent, San Diego County,
6401 Linda Vista Road, San Diego, California 92111.

David J. Meckel, Principal, Rios School,
El Cajon, California 92021.

Portland

Edward C. Wundram, Director, Systems Building Program,
631 Northeast Clackamas Street, Portland, Oregon 97208.

Finding Space in Non School Buildings

L. Street Bathhouse

Charles Ray, Principal, L. Street Annex,
1663 Day Boulevard, South Boston, Massachusetts 02127.

Public Facilities Department, City of Boston,
1 City Hall Plaza, Boston, Massachusetts 02201.

Other Ways

Sim Van Der Ryn, Architect, Farallones,
731 Virginia Street, Berkeley, California 94710.

Berkeley Unified School District,
Office of Public Information, 1414 Walnut Street,
Berkeley, California 94709.

P.S. 211

August Gold, New York City Board of Education,
110 Livingston Street, Bronx, N.Y. 11201.

Frankford Arsenal

Dr. Glen I. Earthman, Executive Director for School
Facilities, School District of Philadelphia, Room 903.
21st Street & The Parkway, Philadelphia, Pennsylvania 19103.

Chicago

Dr. Joseph Han
Facilities Plann

Saul Samuels, I
Chicago Board
Chicago, Illino

The Extended Schoo

Urban High

Kenny C. Guin
2832 East Flam

John Adams High Sc

Dr. Patricia A.
John Adams Hi

The Extended Schoo

Valley View

J. Patrick Page,
Valley View El
Lockport, Illin

Paul F. Swinfo
Dalhart Avenu

Utica

George D. Glin
Utica Communi
52188 Van Dyk

Open Campus Schoo

Brookline

Dr. Robert I. Sp
333 Washingto

Carmen Rinaldi
115 Greenough

Evaluation of P
Rescheduling P

Center for Field
Boston College

Beeville

Lester W. McC
Jones High Sch

Chicago

Dr. Joseph Hannon, Assistant Superintendent,
Facilities Planning Department,
Saul Samuels, Director, Bureau of Architecture,
Chicago Board of Education, 228 North LaSalle Street,
Chicago, Illinois 60601.

The Extended School Day

Urban High

Kenny C. Guinn, Superintendent, Clark County School District,
2832 East Flamingo Road, Las Vegas, Nevada 89109.

John Adams High School

Dr. Patricia A. Wertheimer, Director of Clinical Division,
John Adams High School, Portland, Oregon 97211.

The Extended School Year

Valley View

J. Patrick Page, Research Director,
Valley View Elementary School District #96,
Lockport, Illinois 60441.
Paul F. Swinford, Assistant Superintendent,
Dalhart Avenue, Lockport, Illinois 60441.

Utica

George D. Glinke, Director, Year-Round Schools Program,
Utica Community Schools,
52188 Van Dyke Street, Utica, Michigan 48087.

Open Campus Schools

Brookline

Dr. Robert I. Sperber, Superintendent, Town Hall,
333 Washington Street, Brookline, Massachusetts 02146.
Carmen Rinaldi, Principal, Brookline High School,
115 Greenough Street, Brookline, Massachusetts 02146.
Evaluation of Phase I of the Reorganization and
Rescheduling Plan at Brookline High School,
Center for Field Research and School Services,
Boston College, Chestnut Hill, Massachusetts 02167.

Beeville

Lester W. McCoy, Principal,
Jones High School, Beeville, Texas 78102.

Falmouth

Harry S. Merson, Superintendent, Administration Building, Falmouth Public Schools, Teaticket, Massachusetts 02536.

Winchester

Donald A. Klemer, Superintendent, Winchester Public Schools, Winchester, Massachusetts 01890.

Vincent E. Larocco, Principal, Winchester Senior High School, Winchester, Massachusetts 01890.

Holland

Fred S. Bertsch, Jr., Principal, Holland High School, 600 Van Raalte Avenue, Holland, Michigan 49423.

Home Base Schools

Brookline

John T. Ryan, Director, Vocational Program, Brookline High School, 115 Greenough Street, Brookline, Massachusetts 02146.

Theodore F. Hoffmann, Director, Senior and Junior Year Studies Program, Brookline High School, 115 Greenough Street, Brookline, Massachusetts 02146.

Lexington

Frederick Boyle, Director, Educational Without Walls, Lexington High School, 251 Waltham Street, Lexington, Massachusetts 02173.

Rudolph J. Fobert, Superintendent, Lexington Public Schools, 1557 Massachusetts Avenue, Lexington, Massachusetts 02173.

San Mateo

Dr. A. Hugh Livingston, Superintendent, 650 North Delaware Street, San Mateo, California 94401.

Non School Schools

Parkway

Leonard B. Finkelstein, Director, Parkway Program, c/o The Franklin Institute, 20th Street & The Parkway, Philadelphia, Pennsylvania 19103.

Metro

Nathaniel Blackman, Principal, 537 South Dearborn Street, Chicago, Illinois 60605.

Resource Centers

Cleveland

Donald G. Quick, Director, Supplementary Ed
1365 East 12th Street, Cleveland, Ohio 4411

EPOCH

Dr. Dorothy Bennett, EPOCH Director,
1033 Heinz Avenue, Berkeley, California 947

The Walt Disney School

Jacques C. Brownson, Managing Architect, Public Building Commission, 159 North Dearborn, Chicago, Illinois 60601

Systems Building

Building Systems Information Clearinghouse
3000 Sand Hill Road, Menlo Park, California

"The Trend to School Building Systems"
School Management, August, 1969.

Systems, An Approach to School Construction
The American School Board Journal, January

SEF

Dr. John S. Murray, Academic Director, SEF
Metro Toronto School Board, Toronto, Ontar

Fast-Tracking

Ervin A. Hill, Vice President, Heery & Heery
1705 Commerce Drive, N.W., Atlanta, Georg

Hillsboro School

DeKanter & Holgate, Architects,
213 S.W. Ash Street, Portland, Oregon 9720

Floating Schools

Educational Planning Associates,
54 Lewis Wharf, Boston, Massachusetts 021

Keatinge Keays & Associates,
Massachusetts Institute of Technology,
Branch Post Office Box #1, Cambridge, Mass

Resource Centers

Cleveland

Donald G. Quick, Director, Supplementary Educational Center,
1365 East 12th Street, Cleveland, Ohio 44114.

EPOCH

Dr. Dorothy Bennett, EPOCH Director,
1033 Heinz Avenue, Berkeley, California 94710.

The Walt Disney School

Jacques C. Brownson, Managing Architect,
Public Building Commission,
159 North Dearborn, Chicago, Illinois 60601.

Systems Building

Building Systems Information Clearinghouse,
3000 Sand Hill Road, Menlo Park, California 94025.

"The Trend to School Building Systems"
School Management, August, 1969.

Systems, An Approach to School Construction, EFL, 1971, $2.00.

The American School Board Journal, January, 1971.

SEF

Dr. John S. Murray, Academic Director, SEF Project,
Metro Toronto School Board, Toronto, Ontario, Canada.

Fast-Tracking

Ervin A. Hill, Vice President, Heery & Heery, Architects,
1705 Commerce Drive, N.W., Atlanta, Georgia 30318.

Hillsboro School

DeKanter & Holgate, Architects,
213 S.W. Ash Street, Portland, Oregon 97204.

Floating Schools

Educational Planning Associates,
54 Lewis Wharf, Boston, Massachusetts 02110.

Keatinge Keays & Associates,
Massachusetts Institute of Technology,
Branch Post Office Box #1, Cambridge, Massachusetts 02139.

Large Inexpensive Structures

Domebook Two, Pacific Domes, Box 1692,
Los Gatos, California 95030.

Air Structures for School Sports, EFL, 1964, $0.75.

Antioch College

Rurik Ekstrom, Architect,
10351 Barcin Circle, Columbia, Maryland 21043.

East Windsor

Dr. John Hunt, Superintendent,
East Windsor Regional School District, Administration Building,
Stockton Street, Hightstown, New Jersey 08520.

Micklewright, Hamnett, Bouman & Blanche, Architects,
90 East Stuyvesant Avenue, Trenton, New Jersey 08618.

Economies of Open Space

Walnut Hills Elementary

Edward C. Pino, Superintendent, Cherry Creek Schools,
4700 South Yosemite, Englewood, Colorado 80110.

William C. Haldeman, District Architect, 4700 South Yosemite,
Cherry Creek Schools, Englewood, Colorado 80110.

East Aurora

Warren H. Ashley, Architect,
740 North Main Street, West Hartford, Connecticut 60117.

Joint Occupancy

Joint Occupancy: Profiles of Significant Schools, EFL, 1970, $1.00
New York City Educational Construction Fund,
250 Broadway, New York, N.Y. 10007.

Friends Select

Edward M. Resovsky, Director of Development,
Friends Select School,
The Parkway and 17th Street, Philadelphia, Pa. 19103.

Finding Partners

Arlington

Dr. Joseph Ring
4751 25th Stre

Dr. H. L. Mack
1426 North Qu
Vosbeck, Vosbe
720 North Sain

Pontiac

Bert C. Van Ko
Director of Con
86 Parkhurst S

Portsmouth

Guy P. Morris,
P.O. Box 998,

Williams and T
710 West 21st

Portsmouth Pu
601 Court Stre

SAND

Jack L. Dollard
470 Asylum St

John Wilson, E
South Arsenal N
45 Canton Stre

Welfare Island

Mrs. Felicia Cla
Coordinator/E
New York State
1345 Avenue o

42

Box 1692,

EFL, 1964, $0.75.

Maryland 21043.

istrict, Administration Building,
ew Jersey 08520.
n & Blanche, Architects,
nton, New Jersey 08618.

t, Cherry Creek Schools,
od, Colorado 80110.
Architect, 4700 South Yosemite,
od, Colorado 80110.

Hartford, Connecticut 60117.

nificant Schools, EFL, 1970, $1.00
nstruction Fund,
Y. 10007.

of Development,

Philadelphia, Pa. 19103.

Finding Partners

Arlington

Dr. Joseph Ringers, Jr., Assistant Superintendent,
4751 25th Street North, Arlington, Virginia 22207.

Dr. H. L. Mack, Director of Secondary Programs,
1426 North Quincy Street, Arlington, Virginia 22207.

Vosbeck, Vosbeck, Kendrick & Redinger, Architects,
720 North Saint Asaph Street, Alexandria, Virginia 22314.

Pontiac

Bert C. Van Koughnett,
Director of Community Action Programs,
86 Parkhurst Street, Pontiac, Michigan 48058.

Portsmouth

Guy P. Morris, Assistant Superintendent,
P.O. Box 998, Portsmouth, Virginia 23705.

Williams and Tazewell & Associates, Architects,
710 West 21st Street, Norfolk, Virginia 23517.

Portsmouth Public Library,
601 Court Street, Portsmouth, Virginia 23704.

SAND

Jack L. Dollard, Hartford Design Group,
470 Asylum Street, Hartford, Connecticut 06103.

John Wilson, Executive Director,
South Arsenal Neighborhood Development Corp.,
45 Canton Street, Hartford, Connecticut 06120.

Welfare Island

Mrs. Felicia Clark,
Coordinator/Educational Development,
New York State Urban Development Corp.,
1345 Avenue of the Americas, New York, N.Y. 10019.

REPORTS FROM EFL

The following publications are available from EFL, 477 Madison Avenue, New York, N.Y. 10022.

BRICKS AND MORTARBOARDS
A guide for the decision-makers in higher education: how the colleges and universities can provide enough space for mushrooming enrollments; how the space can be made adaptable to the inevitable changes in the educational process in the decades ahead. (1954) $2.00

SCSD: THE PROJECT AND THE SCHOOLS
A second report on the project to develop a school building system for a consortium of 13 California school districts. (1967) $2.00

DESIGN FOR ETV—PLANNING FOR SCHOOLS WITH TELEVISION
A report on facilities, present and future, needed to accommodate instructional television and other new educational programs. Prepared for EFL by Dave Chapman, Inc., Industrial Design. (1960) (Revised 1968) $2.00

EDUCATIONAL CHANGE AND ARCHITECTURAL CONSEQUENCES
A report on school design that reviews the wide choice of options available to those concerned with planning new facilities or updating old ones. (1968) $2.00

SCHOOLS FOR EARLY CHILDHOOD
Ten examples of new and remodeled facilities for early childhood education. (1970) $2.00

SYSTEMS: AN APPROACH TO SCHOOL CONSTRUCTION
Toronto, Montreal, and Florida projects and how they developed from the SCSD program. (1971) $2.00

GUIDE TO ALTERNATIVES FOR FINANCING SCHOOL BUILDINGS
Chart and book explores conventional and unconventional routes for financing school construction. Includes case histories. (1971) $2.00

PATTERNS FOR DESIGNING CHILDREN'S CENTERS
A book for people planning to operate children's centers. It summarizes all the design issues involved in a project. (1971) $2.00

HIGH SCHOOL: THE PROCE
A "how to feel about it" as well as
planning, design, environmental
social influences of school space. (

A COLLEGE IN THE CITY:
A report of a new approach to the
facilities dispersed through the co
community needs and to stimulate
(1969) $1.50

COLLEGE STUDENTS LIVE
A report on the what, why, and ho
factors involved in planning, build
residences. (1962) $1.25

THE SCHOOL LIBRARY: FA
STUDY IN THE SECONDARY
A report on facilities for independ
size of collections, seating capacity
incorporated. (1963) $1.25

EXPERIMENT IN PLANNIN
THE BALTIMORE CHARETT
A two-week meeting enabled com
planners what they expect of a sch

JOINT OCCUPANCY
How schools can save money by sh
housing or commerce. (1970) $1.

AIR STRUCTURES FOR SCH
A study of air-supported shelters a
pools, and other physical educatio

SCHOOL SCHEDULING BY
GASP
A report of the computer program
and high schools construct their co
$0.75

THE HIGH SCHOOL AUDIT
RENEWAL
Renovation of little-used auditori

22.

ion: how the colleges
ushrooming
ple to the inevitable
ahead. (1954) $2.00
LS
ol building system for
1967) $2.00
HOOLS

d to accommodate
nal programs.
strial Design. (1960)

TECTURAL

e choice of options
facilities or updating

for early childhood

L CONSTRUCTION
ow they developed from

NCING

conventional routes for
istories. (1971) $2.00
EN'S CENTERS
n's centers. It
project. (1971) $2.00

HIGH SCHOOL: THE PROCESS AND THE PLACE
A "how to feel about it" as well as a "how to do it" book about planning, design, environmental management, and the behavioral and social influences of school space. (1971) $2.00

A COLLEGE IN THE CITY: AN ALTERNATIVE
A report of a new approach to the planning of urban campuses with facilities dispersed through the community, designed to serve community needs and to stimulate community redevelopment. (1969) $1.50

COLLEGE STUDENTS LIVE HERE
A report on the what, why, and how of college housing; reviews the factors involved in planning, building, and financing student residences. (1962) $1.25

THE SCHOOL LIBRARY: FACILITIES FOR INDEPENDENT STUDY IN THE SECONDARY SCHOOL
A report on facilities for independent study, with standards for the size of collections, seating capacity, and the nature of materials to be incorporated. (1963) $1.25

EXPERIMENT IN PLANNING AN URBAN HIGH SCHOOL: THE BALTIMORE CHARETTE
A two-week meeting enabled community people to tell educators and planners what they expect of a school in a ghetto. (1969) $1.00

JOINT OCCUPANCY
How schools can save money by sharing sites or buildings with housing or commerce. (1970) $1.00

AIR STRUCTURES FOR SCHOOL SPORTS
A study of air-supported shelters as housing for playfields, swimming pools, and other physical education activities. (1964) $0.75

SCHOOL SCHEDULING BY COMPUTER/THE STORY OF GASP
A report of the computer program developed by MIT to help colleges and high schools construct their complex master schedules. (1964) $0.75

THE HIGH SCHOOL AUDITORIUM: SIX DESIGNS FOR RENEWAL
Renovation of little-used auditoriums in old and middle-aged schools

to accommodate contemporary educational, dramatic, and music programs. (1967) $0.75

MIDDLE SCHOOLS
Controversy and experiment. (1965) $0.50

SCHOOLS WITHOUT WALLS
Open space and how it works. (1965) $0.50

THE SCHOOLHOUSE IN THE CITY
An essay on how the cities are designing and redesigning their schoolhouses to meet the problems of real estate costs, population shifts, segregation, poverty, and ignorance. (1966) $0.50

THE IMPACT OF TECHNOLOGY ON THE LIBRARY BUILDING
A position paper reporting an EFL conference on this subject. (1967) $0.50

THREE HIGH SCHOOLS REVISITED
Andrews, McPherson, and Nova. (1967) $0.50

CAMPUS IN THE CITY
An essay on the physical problems and trends in planning of urban colleges and universities and their potential role as a catalyst in the remaking of the cities. (1969) $0.50

DESIGN FOR PAPERBACKS: A HOW-TO-REPORT ON FURNITURE FOR FINGERTIP ACCESS
Physical solutions to the problems of displaying paperback books for easy use in schools. (1968) $0.50

ON THE WAY TO WORK
Five vocationally oriented schools. (1969) $0.50

THE EARLY LEARNING CENTER
A Stamford, Conn., school built with a modular construction system provides an ideal environment for early childhood education. (1970) $0.50

AN INVESTIGATION OF COSTS OF INEXPENSIVE ENCLOSURES FOR RECREATIONAL AREAS
Analyzes construction and operating costs for seven types of structures. (1969) Free

TRANSFORMA
A report on educa
decade, with finar

AIRCONDITIO
Cooler schools ma
copies free, multi

PLACES FOR E
Identifies types o
education. (1971

TECHNICAL R

2 TOTAL ENE
On-site electric p
a single energy so
water. (1967) $1

3 20 MILLION
A primer to aid sc
school food servic

4 CONTRAST
A discussion of re
(1970) $1.25

5 INSTRUCTIO
ARCHITECTUR
(1970) $1.25

NEWSLETTER

COLLEGE NEW
A periodical on de

NEW LIFE FO
A periodical of ca
Free

SCHOOLHOUS
A periodical on fi
facilities. Free

ional, dramatic, and music

$0.50

) $0.50

ITY
ng and redesigning their
real estate costs, population
rance. (1966) $0.50

Y ON THE LIBRARY

nference on this subject. (1967)

SITED
967) $0.50

nd trends in planning of urban
otential role as a catalyst in the
)

HOW-TO-REPORT ON
ACCESS
f displaying paperback books for

1969) $0.50

TER
h a modular construction system
arly childhood education. (1970)

TS OF INEXPENSIVE
IONAL AREAS
g costs for seven types of

TRANSFORMATION OF THE SCHOOLHOUSE
A report on educational innovations in the schoolhouse during the last decade, with financial data for the year 1968. Free

AIRCONDITIONING FOR SCHOOLS
Cooler schools make better learning environments. (1971) Single copies free, multiple copies $0.25

PLACES FOR ENVIRONMENTAL EDUCATION
Identifies types of facilities needed to improve environmental education. (1971) Single copies free, multiple copies $0.25

TECHNICAL REPORTS

2 TOTAL ENERGY
On-site electric power generation for schools and colleges, employing a single energy source to provide light, heat, airconditioning, and hot water. (1967) $1.25

3 20 MILLION FOR LUNCH
A primer to aid school administrators in planning and evaluating school food service programs. (1968) $1.25

4 CONTRAST RENDITION IN SCHOOL LIGHTING
A discussion of requirements for school lighting, with 18 case studies. (1970) $1.25

5 INSTRUCTIONAL HARDWARE: A GUIDE TO ARCHITECTURAL REQUIREMENTS
(1970) $1.25

NEWSLETTERS

COLLEGE NEWSLETTER
A periodical on design questions for colleges and universities. Free

NEW LIFE FOR OLD SCHOOLS
A periodical of case studies about renovating existing school facilities. Free

SCHOOLHOUSE
A periodical on financing, planning, designing, and renovating school facilities. Free